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# MODEL



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# AIRPLANE

THE WORLD'S PREMIER R/C MODELING MAGAZINE

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# NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

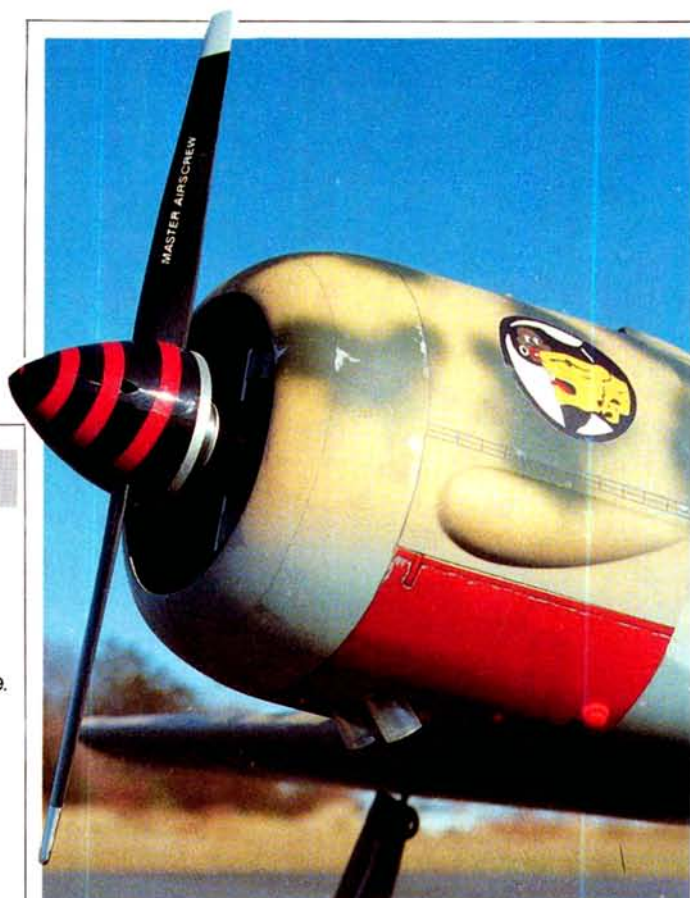
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# MODEL AIRPLANE NEWS



## ON THE COVER:

This month's cover features a vivid color collage of ARF models which have been featured in past issues of *MAN*. While not available at your local hobby shop, the Questair Venture (upper right) typifies the full-scale ARF movement. Venture photo by Budd Davisson, all other by *MAN* staff.

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# MODEL AIRPLANE

The world's premier R/C modeling magazine **NEWS**

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## Editorial

by RICH URAVITCH

**O**KAY GUYS, on the count of three: flyers on the left, builders on the right. One, two, three! If you were really honest, there should be more of you on the left. Let's try again. Given the amount of time you have available for your modeling pursuits, do you prefer flying or building? Now, one, two, three... you two guys remaining on the right, skip over the bulk of this issue because it deals with ARFs or Almost Ready to Fly airplanes, the newest wave on the R/C scene.

I can remember toiling many hours over a sport scale ship, doing all the detailing and weathering that builders do. This followed at least an equal number of hours building the airframe, getting it to the point of detailing and weathering. The "x" of the equation was always the flying. I'd spend so much time building that it was difficult to maintain flying proficiency. I'd have to build something else with which to maintain the proficiency required to be comfortable with what I was building in the first place! Ugly cycle, right?



Along came the first generation ARFs—a step in the right direction. They were relatively quick to assemble but generally overweight. They didn't tolerate vibration well, and the plastic ones would crack in the cold like an outdoor trash can in Antarctica. But they *did* work and filled a definite need.

Enter our newly found leisure time. We've now got a couple of extra bucks, and some extra time but at least a couple of *new* interests. So, instead of having *more* time to build and fly, we actually have *less* since the available time is now split, probably more ways than is really practical.

*Re-enter* the new-generation ARF—lightweight, composite construction, predecorated, well-tested, scale-looking *and* attractively priced. What could be bad?

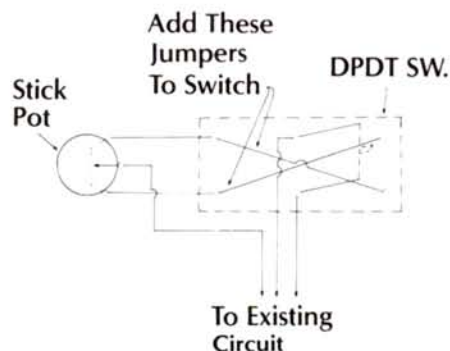
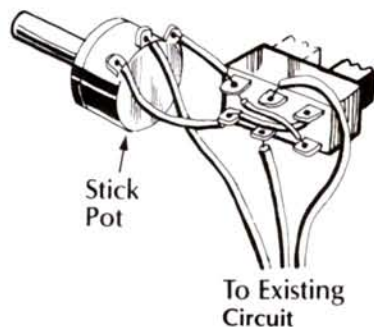
This issue will take you around the ARF world giving you a look at what's available. To satisfy you guys who can still squeak out enough time to finish an airplane, we've included some framed-up, ready-to-cover examples for your review.

These new breeds cover the full R/C airplane spectrum from mini-electric sports like the Kyosho Robin 850 to the Sport Scale Warbird like the Hobby Shack Zero. In between are sailplanes, Comanches, Cessnas, pattern ships and seaplanes. The field is enormous and we obviously can't list everything, but we think you'll find something for everyone and nearly every purpose. The manufacturers and suppliers have reacted to the expressed needs of the modelers. I, for one, am glad that they have, 'cause now I've got something to fly while I continue building and detailing and weathering and....



# Airwaves

Errata: December's "Hints and Kinks" section contained a sketch describing how to install a DPDT switch to provide servo-reversing capabilities if your transmitter isn't factory-equipped. Unfortunately the wiring hook-up was unclear and could be misinterpreted by someone with limited electronic experience. A more detailed illustration is shown here along with a schematic for you technical types. Our thanks to the readers who brought it to our attention.



## Tin Goose Plans

Dear Sirs:

I've put off writing this note to you fine people because I hoped that someone would put a six-foot kit on the market for a Ford Trimotor. I want a kit with the corrugated metal-look of the original Ford which I flew in 1928 at Stapleton Airport in Denver.

I'm seriously ill so I'd like to get going now—not tomorrow! I ask you to help an old fly-boy out. I'm 69 years young, and flew B-17Gs and 25s in 1943-45. I've been building model aircraft since

1923. My first ride was with my dad in his Jenny at a cow pasture near Boulder in 1923. Never been so thrilled!

Enclosed are two pages from *American Modeler* dated March/April 1965. In the article it says:

SPECS: Span: 77.5 inches, 50 in. overall, takes one 60 C.I.D. engine, 10-channel.

Do you folks know of any aircraft makers who have this product?

SCOTTY SNOW  
Boulder, Colorado

Unfortunately the Ford Trimotor plans you have requested are no longer available, as Hobby Helpers, along with the parent magazine, *American Modeler*, is no longer in business.

I've sent a copy of your letter to Mr. Dick Kidd of Radio Control Modeler magazine as they featured a slightly larger Trimotor in their May, 1987 issue. I called Dick to explain your desire to build a Trimotor, and he informed me that he would be glad to send you a set of full-size plans and a copy of the back issue with his compliments. Although they're not exactly what you were looking for, they are at least more contemporary in design and should help you out. How about sending both of us photos of the finished product? Good luck!

RAU



## Praise and Problems

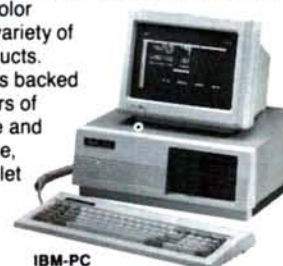
Thank you for a great issue! The October issue was packed with useful information in the many "how-to" articles on hinge-points, radio techniques, scale techniques and more. I could almost see some of your writers scratching their heads in puzzlement that we readers don't already know some of these tricks that seem so obvious to them. As readers have been trying to tell you in past letters to *MAN*, we simply do not.

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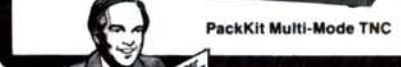
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## Airwaves

Who is there to teach us, if not you! We are not all so fortunate as to have an aero-guru handy. I have been a modeler for many years, and I certainly don't know it all yet. (If I did, I'd write a book.) Also, it was great to see a truly critical product review on the Kyosho Robin, instead of a thinly disguised advertisement.

And while I am thanking you, let me also offer a little gentle criticism. Please, let's have more clarity in your writing styles; if you are going to explain a technical point or construction technique, all the more reason to err on the side of too much explanation rather than too little. When you use a particular term, explain it, and please do not suddenly refer to it by another name, leaving me to wonder if I missed a paragraph. A prime example is the last article on "Sporty Scale Techniques" for rivets and panel lines. The writing is hurried, with just a hint of a patronizing tone. Exclamation points and the comments which precede them do not make up for lack of detail and clarity, and ironically enough, do not really communicate excitement or humor, either. The article was puzzling. I found myself with more questions than answers.

Please, try to eliminate the male chauvinism inherent in most of the writing in *MAN* (no pun intended). I know that the sport is, and has always been, dominated by men. But, for all the women modelers who regularly appear in your pages, for all the great women aviators, from Amelia Earhart to Jeanna Yeager, and in particular for my mate, co-pilot, and (beautiful) wife, open your eyes and stop referring to "us guys" as though we were the only ones in the game.

GARY BULLOCK  
Balsam Grove, NC

*Thanks for your positive comments and criticism—we need input like yours to keep improving the magazine and meeting the modeler's needs.* RU

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We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.





# Fifty Years Ago...

by ART SCHROEDER



**F**IFTY YEARS AGO this month, in February 1938, the modeling community was patiently awaiting a solution to the perplexing problem of how to guide their model airplanes by radio control. Although there was a great deal of speculation on when a functional system would surface, a majority of modelers, including the staff of *Model Airplane News*, recognized that it was going to be some time before any of the prototype radio-control systems would be available for public consumption. The focus of the magazine, and the modelers, had shifted back to the still-popular rubber and gas-powered free-flight planes that were growing in popularity hand over fist.

Articles featured in this issue of *Model Airplane News* included "Eliminating Guess Work from Prop Building," and four articles for all different types of planes were featured for the rubber-powered plane enthusiast. Columns like "Gas Lines" and articles such as "Designing Your Gas Model" and "Timing Your Motor Run by Measured Fuel" were included for the gas-powered plane enthusiast.

On the frontiers of full-scale aviation, the Italians, with strong support from their German allies, put together an airshow in Milan so Mussolini and Hitler could show the world that they were no slouches when it came to aeronautical technology. The few planes that represented Germany in the Milan Airshow included the Heinkel H.E.112, and the Focke-Wolfe Autogyro. At the time, the Heinkel H.E.112 had a Jumo 680hp engine under the hood, and the Germans were considering replacing it with an 1100hp Jumo. The wingspan of the Heinkel was 32 feet, fuselage length 30 feet, height 12 feet, and gross weight around 2230 pounds. Experts estimated that with the 1100hp engine the Heinkel would fly at a top speed of 320mph and climb at the rate of 460fps. The Bergamaschi, Breda 82, Caproni CA135, Fiat B.R.20 and the Piaggio P.32 had a much more impressive showing in their native Italy. The Bergamaschi was the only training bomber of the group and was a low-wing ship with very smooth lines.



The new Aircuda goes through its trial flights at Wright Field. Note the two light cannons in the nacelles.

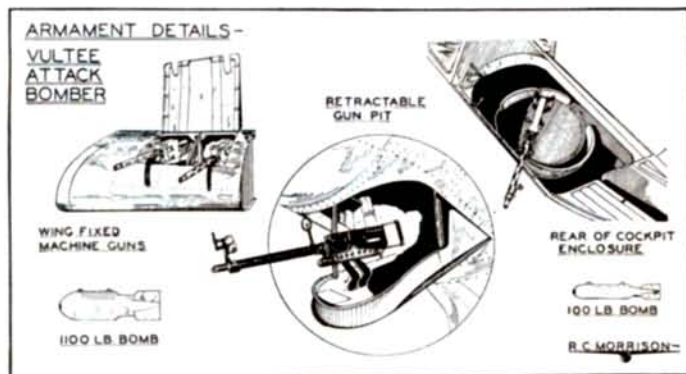
Outside of the airshow in Milan, a new French tri-motor 22-passenger plane with a striking resemblance to the Ford Tri-Motor passenger plane was introduced. Behind the Iron Curtain, the Russians were coming up with their aircraft, including the imported Martin Clipper, which weighed in at a healthy 31 tons and was powered by four 1000hp engines. Another eye-catcher from the Russians was the nameless, and tailless, twin-engine fighter with turrets front and rear and a feather-like paint job to disguise it as a bird!! The Americans seemed to be on the leading edge of aviation technology



What is this? Just a new Russian tailless twin-engine fighter with front and rear turrets. A bird of prey?

with the introduction of the Grumman F3F, Great Lakes XBZG-1, Vultee V-11-GB, Curtiss SBC-3 Helldiver, and the new Bell Airacuda twin-engine pusher fighter that was powered with a pair of 1000hp Allison engines.

During this time, the war in Europe had become heated, and all of the superpowers, engaged or not, were pumping out combat aircraft at breakneck speeds in order to keep their piece of the pie. *Model Airplane News* was there, bringing you the latest information on the hottest new combat aircraft geared for use in the second World War.



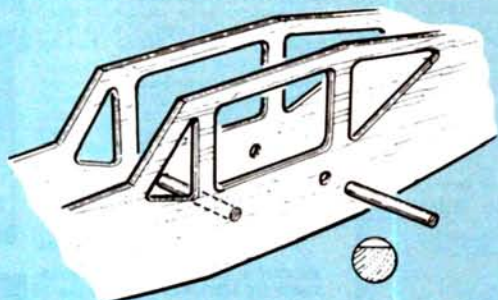
On the Vultee Attack Bomber the gunner was dropped down from the belly and was given a very wide range.



# Hints & Kinks

by JIM NEWMAN

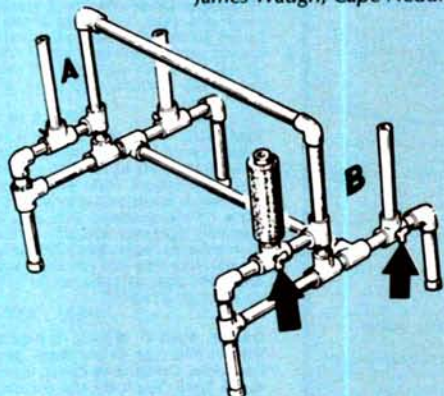
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



## PARALLEL SERVO MOUNTS

Many modelers seem to have trouble placing servo mounts parallel and level with each other. Try this. Sandwich the fuselage sides together, determine the servo location from the plan, then drill holes to accept  $\frac{1}{4}$ -inch or  $\frac{3}{16}$ -inch dowels. After the fuselage is assembled and squared up the dowels can be pushed through and glued as shown. You should also file flats on the dowels as platforms for the grommets, except where they're glued into the holes. (See cross-section.)

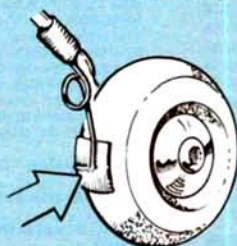
James Waugh, Cape Neddick, Maine



## MODEL CADDY

Half-inch PVC plastic pipe, Schedule 40 PVC 90-degree elbows, Schedule 40 PVC tees, PVC pipe cement and  $\frac{1}{2}$ -inch pipe insulation combine to make this caddy. Wings go in space A and fuselage in B. Four of the tees are drilled through  $\frac{1}{4}$ -inch to slide over the pipe. They are also drilled and tapped  $\frac{1}{4}$ -28 for thumb screws (arrowed). Use PVC pipe caps or rubber crutch tips as feet.

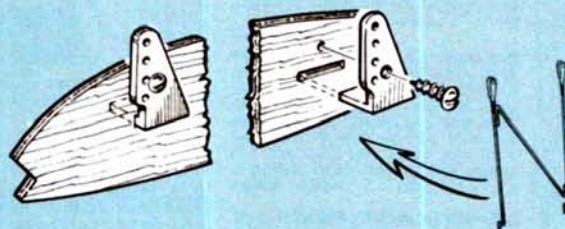
Dan Rudig, Sherwood, Oregon



## FRICTION BRAKE

Large propellers provide a lot of thrust, even at idle, and on hard surfaces it's difficult to come to a complete stop. This little drag brake attached to the tailwheel is adjusted to hold the model at idle. Any higher rpm will overcome the drag and allow taxiing. On wheels less than 1 inch diameter a rubber washer between the collar and the hub seems to work better. See "Hints and Kinks," October, 1987.

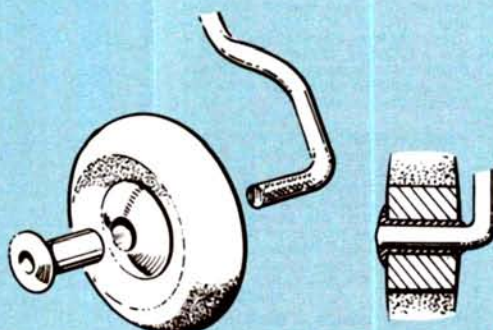
Tom Ekstrand, Hudiksvall, Sweden.



## BIPLANE STRUT MOUNTS

Where your interplane struts attach install a ply rib which is slotted to accept a pair of control horns as a firm fit. The mounting feet of the horns dissipate the strut loads over a much wider base, the single screw doing no more than keeping the horns in place and therefore carrying no load. The struts attach with ordinary Z-bends at the lower end, and clevises at the top to allow for final fitting and incidence adjustment.

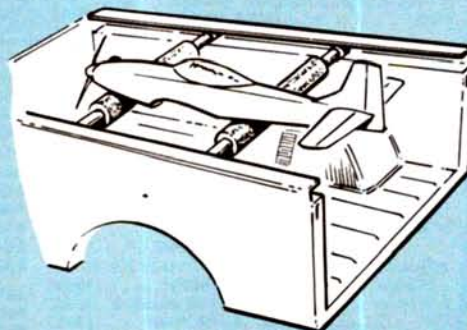
Hal Parenti, Westchester, Illinois



## TAILWHEEL RETAINER

This very tidy method of retaining eliminates unsightly collars or soldered washers, and would work on main wheels too. Drill out the hub to clear the large eyelet on which the wheel is to run. Next, quickly sweat-solder the eyelet to the wire axle to avoid heat damage to the plastic hub. If you prefer, the wire could be roughed-up and a spot of cyanoacrylic used instead, so eliminating the need for heat.

John Rice, Los Angeles, California



## TWO-TIER MODEL TRANSPORT

Having only a small pick-up truck this owner doubled his model-carrying capacity by using two expanding curtain rods jammed across the back as shown. He used plastic tape on the rods where they might chafe the models, but pipe insulation (shown) would be good too. Models are retained by bungee elastics looped over. Other models store below.

Ralph Henrich, San Jose, California

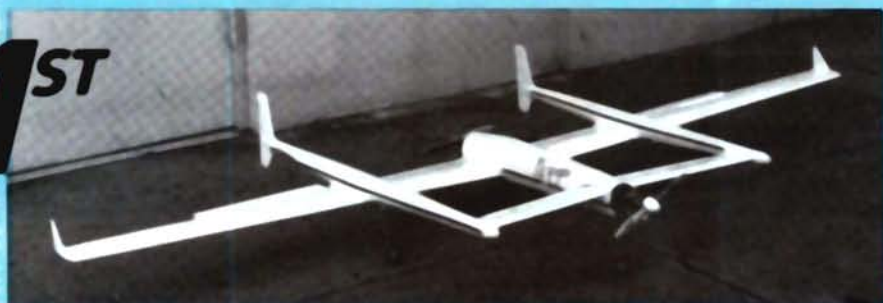


**2<sup>ND</sup>**

**DOUGLAS DC-3**—Sport scale, 75½" span, 20 4-stroke (2); David Ramsey, Milltown, NJ

**3<sup>RD</sup>**

**SB2U-1 VINDICATOR**—Sport scale (1¼), 84" span, S.T. 3000; "Doc" Keith, Madera, CA

**1<sup>ST</sup>**

**VOYAGER**—Sport scale, 88" span, 25-30 (2); Calonico/Junker, New Orleans, LA

**4<sup>TH</sup>**

**WACO SRE**—Scale, 70½" span, 90 2-cycle; Douglas Hobbs, Lumberton, NC

**5<sup>TH</sup>**

**CF-101 VOODOO**—Sport scale, ducted-fan, 53" span, 72/Viojett; Ian Ward, Alta, Can

## DESIGN CONTEST WINNERS

**A**FTER TABULATING over 5000 reader votes, in which the winners were never really clear until the final vote was counted, here are the winners of the *Model Airplane News* Great R/C Design contest. The winners have been notified and we are awaiting return of the required material to process the articles and award the prizes.

We were overwhelmed by the response to our request for design entries, and by the number of people who took the time to vote for their favorite airplane. In addition to supporting our notion that there are very many talented modelers out there, we made a number of other interesting observations during this competition. While we received many unique designs, the majority of the entries were sport models using well-tried dimensions, moments and powerplants.

This lends credence to the idea that most R/C

modelers are sport fliers who like to get out and bore holes in the sky without the added complication of tuned pipes, retracts and other specialized requirements. That seems to be the type of airplane they like to build and fly. What they generally like seems to be quite different!

Notice that *all* of the winners modeled scale or sport scale subjects, and that they became winners by popular vote of other modelers. Seven of the top ten finishers were scale airplanes. That either tells us to expect a great upswing in scale activity, or that modelers just like to look at the scale efforts of other modelers. Either way, we'd like to thank all winners and entrants for taking the time to submit their designs. Thanks also to all the modelers who cast their ballots. You all helped to make our first design contest a resounding success. We'll do it again. ■



# How To:

by RANDY RANDOLPH

## BUILD A CONTOUR SANDER

**The leading and trailing edges of all flat surfaces should be rounded to improve their looks as well as their aerodynamic efficiency. The simple tool described in the photos will produce smooth, rounded edges on balsa surfaces with a minimum of effort.**

1. Tools and materials necessary to construct the contour sander include: a 6-inch length of 1x2-inch hardwood, a 2x3-inch piece of 100 grit garnet paper, a 1/4-inch drill and some instant glue.

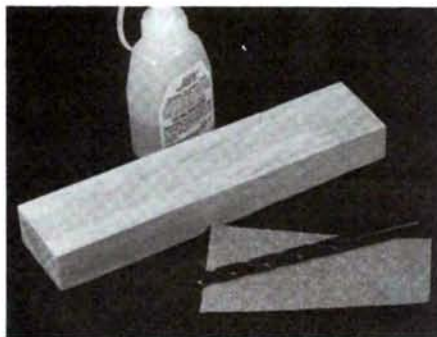
2. Cut the 1x2 in half and join the wide sides in a vise or clamp. Mark the center on the seam between the two pieces and drill completely through the blocks with the 1/4-inch drill.

3. When the blocks are separated each should have a half-circle groove down the center. Apply slow-acting glue to the center of the notch.

4. Press the sandpaper down into the groove. In this case a piece of 3/16-inch dowel makes a good tool for forming the sandpaper into the rounded groove.

5. Add instant glue between the edges of the sandpaper and the block, and press the top of the block against a flat surface to hold the sandpaper in place.

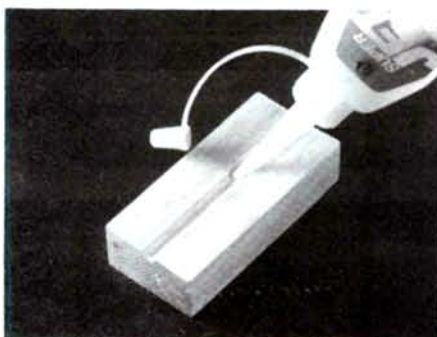
6. To use, hold the tool perpendicular to the edge and sand. This block was made to sand 3/16-inch stock. Different sizes of stock can be handled by drilling the original block with a larger or smaller drill. The drill size should be 1/16-inch larger than the size of the stock to allow room for the sandpaper.



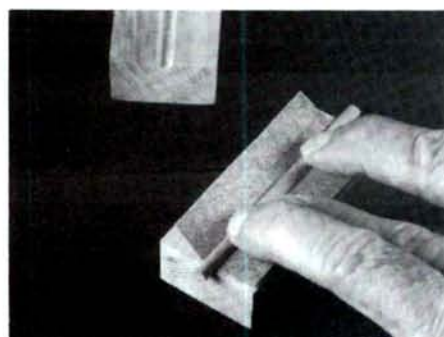
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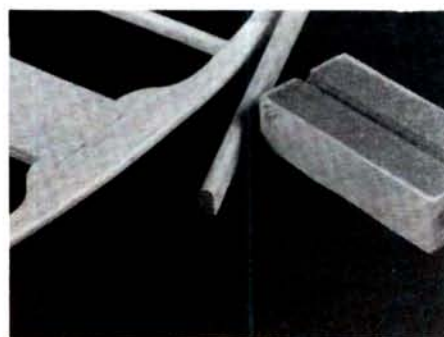
3.



4.



5.



6.





SO, ANYWAY this UPS truck backs up to my garage and I see this giant box, about the size of a VW, coming out of it. It's a shiny, colorful box with a nouveau-Revell look to it. What really blew me away was the number 11 X-Acto and the glue that were in the truck with it. The X-Acto had the diameter of a tele-

was beautiful! Everything about it was absolutely right. I even found I could use my  $\frac{3}{8}$ -drive ratchet to work on it.

Pretty soon, I had this unbelievable 1:1 model of a Glasair III parked in front of my house and I still hadn't figured out how the radios were supposed to work, and there was no transmitter in the kit box. While I was lying on my back under the airplane looking for an antenna lead, I saw a pair of Nikes approach and heard a voice ask:

"How soon you going to take her up? I've already got 110 hours on mine."

Rolling from under the airplane, I was asking the stranger how I could hook the servos up when he turned and pointed up:

# ARFs and KITPLANES

**IT'S ONLY  
A MATTER  
OF WHERE  
THE PILOT  
SITS!**

Article and photos  
by BUDD DAVISSON.

phone pole and it took two guys to carry the jug of C/A!

I'd gone the same route as the other guys in my R/C club. First, it was a series of  $\frac{1}{4}$ -scale birds. You know: Mustangs, Corsairs, etc. Then I moved up to a  $\frac{1}{3}$ -scale Pitts, then a  $\frac{1}{2}$ -scale Cub. But this new bird was to be my first 1-inch to the foot R/C Almost-Ready-to-Fly machine. It used all the trick stuff, including composites that had the ribs and spars molded in place. There wasn't much to cut since the windows and doors already fit perfectly.

I was really getting into this project until I ran into a stonewall with the radio installation. I couldn't figure out how the servos hooked up. No... worse than that... I couldn't *find* the servos! And the receiver? It said something about LORAN on it, and another one had buttons on it labeled "Ident" and "Mode."

Then I looked at the engine. Talk about detail! A four-hole, Lycoming replica. It

*Call it a Cub and you're wrong!  
Direct relative of the Eagle,  
Christen's new Husky.*





"Hey look, here comes my partner in ours!"

I cocked my head up in time to see a white streak moving overhead. I started to comment on how high it was and then I caught what he'd said.

"What do you mean: Here he comes 'in' yours? What do you mean 'in'?"

My voice rose to a squeaky crescendo.

"Are you saying 'in'—as in 'sitting in'? You're telling me this is a REAL airplane I just built? Jeez, I *thought* it was well detailed!"

I also thought it was kind of expensive for a model, but I didn't mention that.

A fictional tale? Absolutely! Impossible? Certainly not! We've reached the point where the gap between big models and little airplanes has approached zero and



Ross Grady in his Ranger-powered homebuilt P-40C Kittyhawk replica. Either scaled down real one or scaled up Ziroli.

this is especially true in the almost-ready-to-fly kitplane homebuilt market. The techniques are the same, the shapes are the same, only the pilot's viewpoint is different.

Some of you probably think this is BS, but it's not. The market in homebuilt airplanes has changed rapidly in the past five years. The old image of a builder painstakingly whittling pieces of 4130 chromemoly steel into an airplane from crude plans read by candlelight is fading into the ancient past. The modern homebuilder actually *does* receive a giant kit box in the mail. Only the lumber-size X-Acto is missing. And the kit would be totally recognizable by any modeler worth his salt because this collection of real airplane parts won't have a single thing in it that's anything but a scaled-up model part.

With just a few exceptions, the new homebuilt kits utilize large composite components made in female molds and split down the center line ala plastic models. The fuselage is usually in two halves, with the bulkheads already molded into one half. Ditto the wings. The newer kits have the ribs and spars in place, and all you have to do is run a few cables (no servos, remember?) and some plumbing, butter the glue onto the rib/spar edges and plop the top wing skin in place. Since the parts are made with a gel coat, even the





# ARFs and KITPLANES

final finishing moves quickly.

The structural material is straight from your local hobby shop. Every surface skin is a sandwich made up of 1/4- to 1/2-inch closed cell (not expanded polystyrene like some ARFs) foam sheets which are faced

with resin-impregnated cloth, usually fiber glass. The favorite resin is epoxy although at least one manufacturer has opted for a

polyester system to avoid the acquired-allergy problem that can be caused by constant exposure to epoxy.

In manufacturing, female molds are first sprayed with a gel coat and then a coat of epoxy. The cloth is spread onto that, the layer of thin, flexible foam is squished in and then another layer of cloth (or two). Next, either an inflated bag or a matching mold is forced over the entire mess and this jams the sandwich together wedging it into every tiny cranny of the mold. What emerges is an impossibly light, unbelievably stiff component looking



*Stoddard-Hamilton's new Glasair III. Wider, faster and longer. Closing in on the MPH per HP milestone!*



*A Lancair forms up in the ultraslick Velocity. New design incorporates all the lessons this fan learned about canards. Both kits!*

exactly like a big model airplane part. I mean *exactly* like a model part.

The original quick-to-build homebuilt kits using composites left it up to the builder to trim and fit the pieces together, but the new ones have eliminated even that step. Today, the edges of the pieces are factory-trimmed to shape, and they feature joggled edges that help nest the two joining parts together. Many of the parts even have indexing marks molded in just



like the locating pins on a plastic model kit.

And what kind of an airplane do you get in your average 1:1, man-carrying model kit? As a general rule, you get a machine that can blow its factory-made counterpart into the weeds in every category. Since most use composites which give total flexibility in forming compound curves, they look like they're shaped by the force of the wind itself, and have flowing, beautiful lines that spell speed. And, yes, they're all fantastically fast, for their power. The Lancair, for instance, can carry two people at 200mph plus on the same engine that has to huff and puff to drag a Cessna 152 through the air at 110mph. The Glasair III can cruise at speeds almost equal to a Mustang—265mph and up.

But, being fast is no good if you have to land every couple of hours for fuel. Not so with the new breed of homebuilt. They all have the longest legs you've ever seen. If a new design can't do at least 1200 miles between feedings it's considered a "pansy." Some, like White Lightning can do 2,000 miles without a drink. That's coast-to-coast with one fuel stop and lots of gas left over. Of course, none of the foregoing takes into account that most pilots have a 500-mile bladder!

At Oshkosh this year I tried the hottest of the kitplanes, the Glasair III, and it really showed how far the industry has come. I saddled up with akro ace Bob Herendeen one busy morning and before I had the throttle half-way to the stop I knew I was going to love the airplane. At full throttle it has the feeling only found in really high-performance birds and fast cars, as defined by the muscle cars of the '60s. The feeling is one of hanging on for



*Questair Venture—all metal kitplane with 250kt cruise and 2200fpm climb. Designed with the amateur builder in mind.*

dear life while the machine races out from under you.

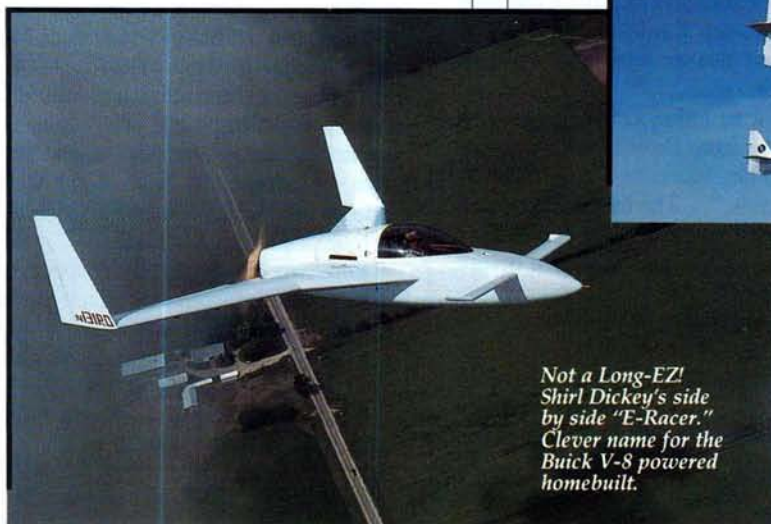
As we rocketed off the ground, I was forced to sandwich myself between an active crosswind runway and a Breezy (that 70mph birdcage which will forever keep 1910 aviation alive) and I was closing on it at Warp 9. As I threaded between him and the other runway, I kept the nose down and my eyes outside the cockpit so I wouldn't get in his way or wind up with squashed Breezy on my windshield.

In that position, just having brought the gear up and barely using climb power, in any other airplane, I'd be showing maybe

*(Continued on page 80)*



*A pair of White Lightnings show just how slippery the homebuilt designs have become. Clear the workshop!*



*Not a Long-EZ! Shirl Dickey's side by side "E-Racer." Clever name for the Buick V-8 powered homebuilt.*



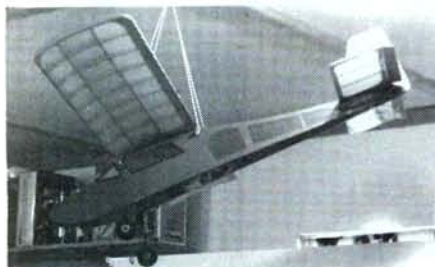
# Small Steps

by RANDY RANDOLPH

**S**INCE THIS COLUMN has been running I've received a number of very interesting letters. I think it's safe to say that the majority of modelers fly small-class airplanes of both glow and electric types. Some letters describe success or failure with a particular airplane or kit. This is information we're all interested in, and the reason for the existence of this column. Other letters are full of hints and better ways to treat our types of aircraft. These are great too! However, I occasionally receive a letter like the following one from Ed Westwood, of 909 S. 173rd, Spanaway, WA 98387. He also included charts to prove his point.

"...I read your statement 'small wings generate less lift per square inch than larger wings because they displace less air.' I suppose that's the bottom line, but why?

"The answer is Reynolds Numbers. Most of our stuff flies in the laminar region where the viscous forces predominate over the inertia forces. This causes two things that work against small wing cords. The lift curve shallows slightly and you get early separation. The lower lift curve slope means it takes a bit more angle of attack to generate the same lift. Early separation limits the max CL usually to less than 1 inch for small cords.



Ken Willard designed the Showmaster years ago, still one of the better  $1/2A$  designs. What would Ed Westwood think of that banana shaped airfoil.

"A 4-inch cord at 18mph is in the 75,000 RN range. My data suggest that a NACA 4412 airfoil works well in the low RN range, and the NACA 23012 isn't too bad!"

"I took a few years off from flying, and then decided to get back into R/C. I



Young Sheri shows Titewad, one of the best .25-powered airplanes ever. Plans available from MAN.

thought I needed to build a 're-trainer' and the Q-Tee was still available. This time I built it with cyanoacrylate glue thus reducing weight by about 2 ounces. The old EK was still in good shape so I put it into the model and off we went! The airplane builds easily, flies well and is miserly on fuel.

If Ed's reference to 75,000 as a low Reynolds Number doesn't sound low, remember that millions and millions are more typical.

The 4412 has been a favorite for a long time, and the addition of a flush top spar midway between the leading edge and the main spar also seems to help. Try it on your next design.

Now, just to balance the geography, here's a letter from Dave Linehan, of 343 Saddlehorn Dr., Houston, TX 77060.

Dave writes, "... The first R/C trainer I built was the parasol-wing Airtronics\* Q-Tee. This was back in '78 and before the widespread use of cyanoacrylates. Though the airplane was MonoKoted, the structure was built with good ol' Ambroid and 5-minute epoxy. The radio system was an EK Ranger (dry batteries and single stick) with a Cox\* Black Widow up front. The airplane flew well despite its weight, and proved to be a docile trainer.



The Q-Tee in all its glory. See Dave Linehan letter for some good words about this bird.

"...I've found that particular attention must be paid to the weight and balance of smaller models. One can cheat just a little on weight but the balance is critical. I am a fanatic when it comes to having the CG right where the plans indicate it should be. In an airplane like the Q-Tee balance is very important as when the engine shuts down you essentially have a glider. All landings are dead stick and a tail-heavy airplane does not glide well..."

These two letters use all my space, but both contain information which should be passed around. Now it's time to hear from you, and when you write don't forget the glossy black and white photos.

\*The following are the addresses of the manufacturers mentioned in this article:

Airtronics Inc., 11 Autry, Irvine, CA 92718.  
Cox Hobbies, 1525 E. Warner Ave., Santa Ana, CA 92705.







# S U P E R



# L A S E R

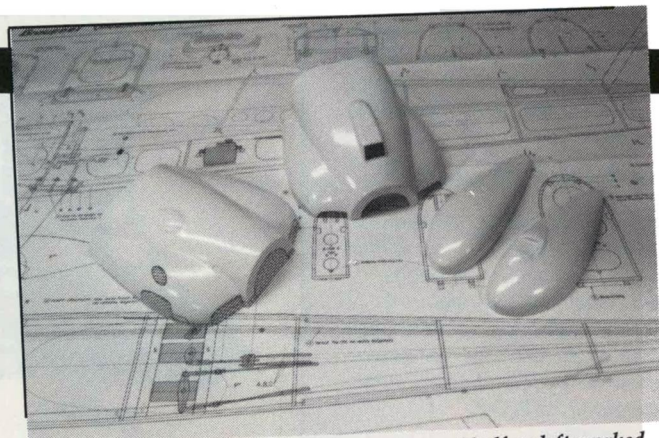
by CHRIS ABATE

**F**EW AIRCRAFT have caught the attention of kit manufacturers as much as the P-51 Mustang, J-3 Cub, and the CAP-21. One which is fast joining their ranks is the Laser 200. Graupner Manufacturing, based in Germany, has now kitted their version of the Laser 200. It's called the Super Laser and it's distributed throughout the U.S. by Hobby Lobby International\*. I think they have a real home run here. Upon opening the box, you'll find a ready-built balsa and ply fuselage which is both lightweight and straight.





## Almost ready-to-cover semi-scale performer



Vac-formed cowl and wheel pants. Note cowl half on left marked prior to trimming for specific engine.

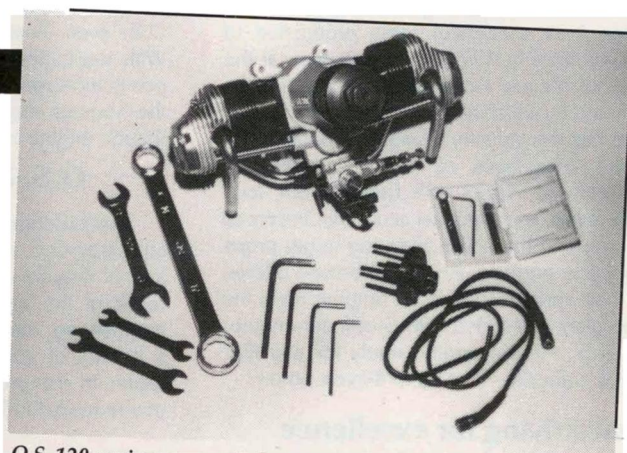
The foam wings are pre-sheathed with balsa, and have all the cut-outs for bell crank and servo openings. There are also slots for full-depth spars, both fore and aft, and the ailerons are cut out along their leading edges. The rudder and elevators are solid balsa, pre-shaped and pre-slotted; nice touch!

All these items are really a welcome treat and much appreciated. You'll also find a two-piece cowl and wheel

made of die-cut lite-ply formers and balsa sheeting which is die cut to the correct shape.

This section is built directly onto the wing. Two bolts forward and two dowels aft lock the wing/center section to the fuselage. Another construction task is the stab and vertical fin assembly. This is done by using the pre-printed balsa sheeting. Just cut and glue in the balsa pieces, glue on the top sheeting and that's it. The vertical fin or rudder post is also pre-slotted for hinges. About all that's left is the shaping of the landing gear and fuselage chin blocks. Next, glue the wheel pant halves together and prepare for painting. The cowl halves are pre-marked for trim lines as are the cut-outs for the O.S. FS .90 4-stroke. If you elect not to use this engine, cut-outs must be tailored to the engine you choose.

**Type:** Semi-scale ARF  
**Manufacturer:** Graupner.  
**Power:** Suggested—O.S. .90 4-stroke.  
 Used—O.S. FT-120 twin 4-stroke.  
**Wingspan:** 67 inches.  
**Weight:** Manufacturer predicted, with O.S. .90 4-stroke—8.25 pounds. Actual, with O.S. FT-120 twin 4-stroke—9.50 pounds.  
**Wing area:** 743 square inches.  
**Wing loading:** Predicted—8.25 pounds; 25.6 square feet. Actual—9.50 pounds; 29.5 square feet.  
**Channels:** 4—elevator, ailerons, rudder, throttle.  
**Suggested retail price:** \$495.



O.S. 120 engine as supplied with complete tool and accessory kit.

pants which are vacuum-formed ABS plastic, a heavy-duty clear canopy, some die-cut lite-ply, balsa parts and a very sturdy, laminated, fiber-glass landing gear. Well, if those aren't enough features to get you excited, then you really ought to get back into plastic kits!

**CONSTRUCTION:** This is straightforward and easy.

The fuselage is finished off by gluing on the turtle deck sheeting and the nose above the fuel tank compartment. The fuse center section above the wing is

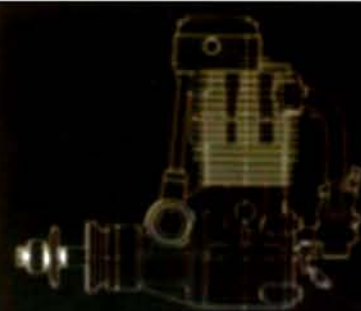
After discussing the engine possibilities with Mr. Chianelli, who isn't happy unless he's doing Mach 25 with his pants on fire, I decided on an O.S.\* Gemini II Twin Cylinder 4-stroke.

As with any aircraft, while construction is under way you should be thinking about radio installation. Graupner has thought about this for you. Notches in the fuse sides are there for the servo rails, and all the formers aft are pre-drilled for the outer flexible pushrod sleeves—one for each elevator half and a set for rudder hook-up.

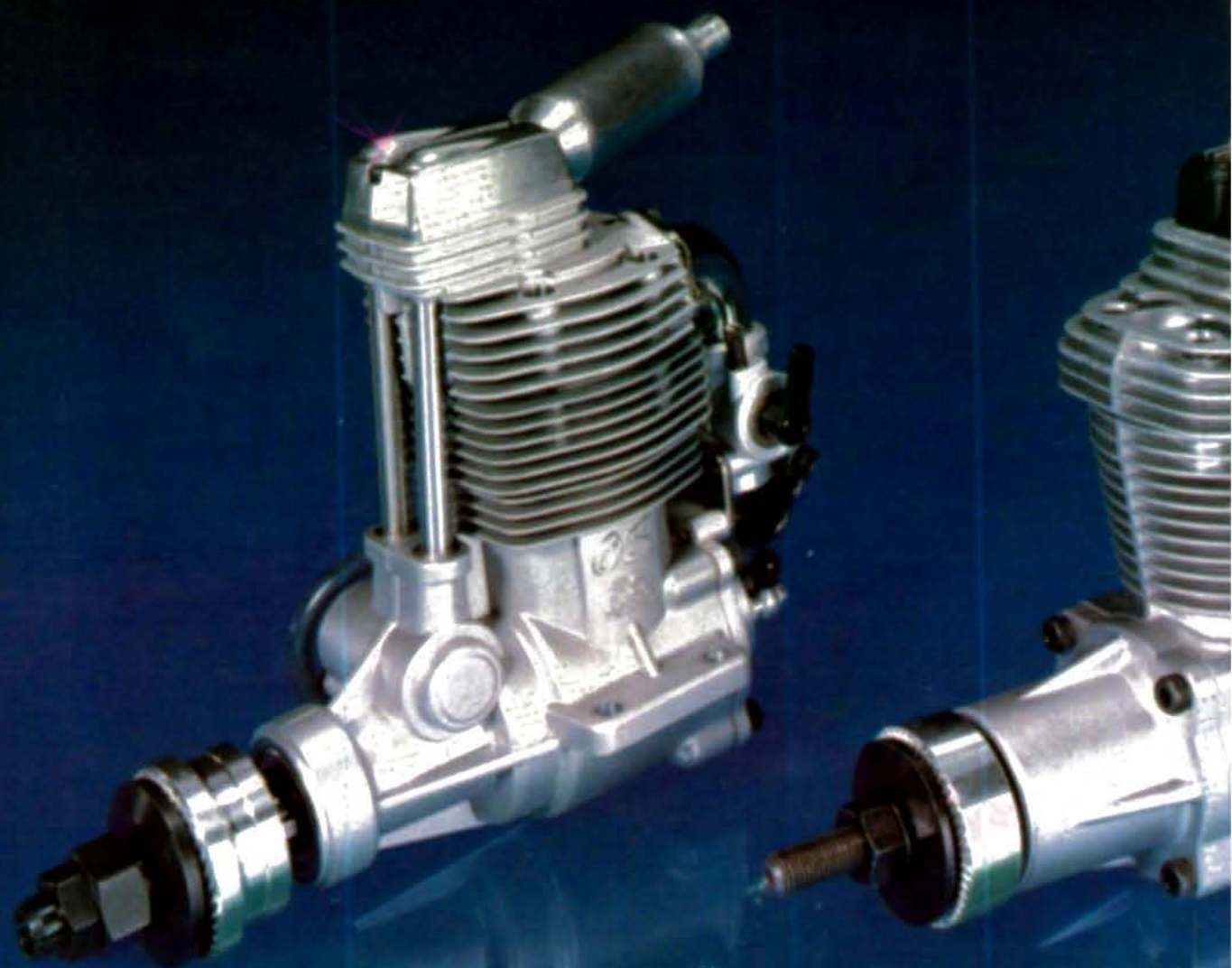
Holes are also pre-drilled in the formers for routing your antenna inside the fuselage. I mentioned split elevator hook-up; the two pushrods coming from the elevators join at an aluminum block which then turns into one pushrod to the servo (see photograph). A neat, clean hook-up. What usually takes hours to set up takes only a short time, thanks

(Continued on page 38)





# 120 SHOOT-



**H**EAVY METAL is a term used for a number of different things: music, aircraft, cars, to mention just a few. In this article, the term "heavy metal" refers to 1.20 cubic-inch 4-stroke engines, not in the sense that they're heavy in weight but in power. I'm going to compare three of the leading 1.20/4-stroke engines. The three engines tested were all 4-stroke overhead cam engines, and I'll discuss them in alphabetical order. I'll do it this way so that you won't think I have a preference. I hope to provide the information you may need if you decide to purchase one of these engines.

These engines and accessories were reviewed: the Enya R1.20-4C,



# OUT

## HEAD-TO-HEAD WITH THE BIG IRON 4-STROKERS.

by CHRIS ABATE

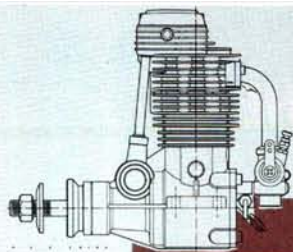


O.S. FS-1.20 Surpass, and Saito FA-120 Special.

Let's start with general appearance as shown in the photos. You'll notice that each engine has a distinctive look. The instructions provided with each engine are all complete and informative including a description of the engine, recommended break-in procedures, recommended props, fuels, care and maintenance. Safety tips are also included, and all three literature packets supplied ample information.

**Accessories.** Enya accessories included: needle-valve extension, feeler gauge, open-end wrench, small straight-slot screwdriver to set valve clearances, Allen

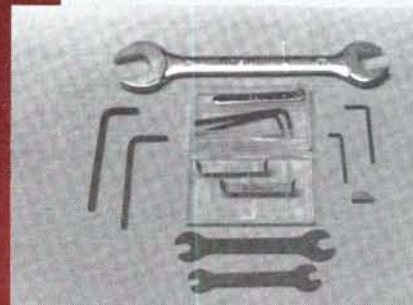




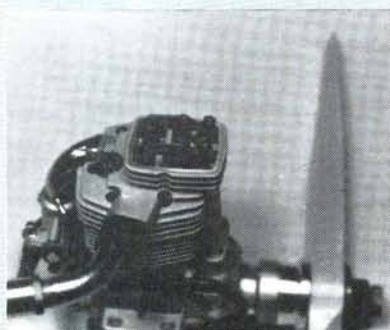
## O.S. FS-1.20 SURPASS



O.S. accessory pack includes wrenches and feeler gauges for servicing.



O.S. mounting template and color mylar decal sheet.



Top: O.S. 120 Surpass. Note flexible breather tube running from front bottom crankcase to intake manifold. Above: access is easy to adjust valves on the O.S.

wrenches and Mylar decals.

O.S. accessories included: needle-valve extension, choke extension, 3 open-end wrenches, an extra woodruff key, Allen wrenches, a mounting hole template and a Mylar decal sheet. A valve-adjusting kit housed in a snap-lock plastic box and including two feeler gauges, a spanner wrench and two Allen wrenches is also included.

Saito accessories included: needle-valve extension, choke extension, feeler gauge, spanner wrench, screwdriver for valve adjustments, open-end wrench, Allen wrenches, breather nipple for crankcase breather tube, Mylar decal sheet, and a nice key chain. Also available on a limited-time offer is a very neat and effective fuel bowl filter.

**Intake/Exhaust Valve Setting.** Once the rocker-box covers were removed, access to valve-clearance adjustments was easy. The same procedure is used for valve adjustments in each engine. The O.S. is different from the Enya and Saito

in that an Allen wrench is used instead of a straight-slot screwdriver to adjust the screw which allows you to set the valve clearances.

**Glow Plug Location.** The plug location may be of interest to some of you. Enya has the glow plug on the forward side of the engine while O.S. and Saito have it to the rear. The latter seems to be a safer position when trying to remove the glow clip with the engine running. If a remote glow plug setup is used it wouldn't present any problems.

**Locking On The Prop.** Enya uses the standard prop washer and prop nut. O.S. uses a double locknut arrangement. The prop nut is affixed first, and then a split collet nut is threaded to the driveshaft locking it against the prop nut and also compressing it around the driveshaft. Saito uses a split nut collet arrangement too. The split nut compresses against a concave prop washer which collapses the



# ENYA R1.20-4C

## Equipment Used In Testing

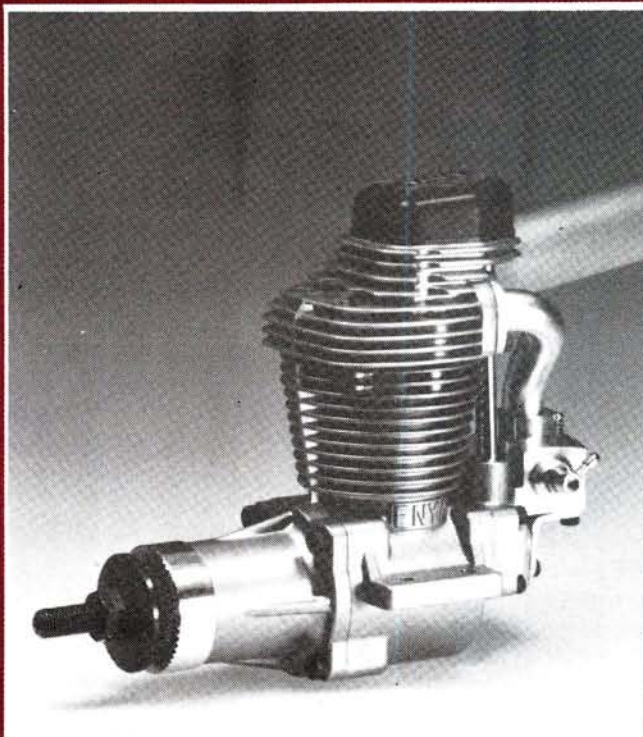
**Tachometer:** Futaba FP-BT1  
Tach-O-Timer.

**DB Meter:** Radio Shack  
Realistic Model 33-2050.  
Range: 60-123db.

**Temperature Probe:** Omega  
Model 870 Digital  
Thermometer.  
Range: 200-2000°F  
200-1370°C

**Temperature (outside air):**  
Scaled thermometer Fischer  
Scientific.  
Range: 30-200°F

**Humidity:** Direct Reading  
Hydrometer Bacharach  
Instrument.  
Range: 0-100%



Enya 120R with and without cover, adjustment access is also easy with the Enya like the O.S.

nut around the threads of the engine shaft.

Both O.S. and Saito seem to have taken some time to engineer a good safety-locking prop nut.

**Carburetor Chokes.** Enya doesn't employ a choke system on this engine. O.S. uses a clapper-type of choke which is spring-loaded to the open position and, when held closed, a rubber disk closes off the carb. Saito uses a slide-type choke—essentially a captive sliding plate with a hole in it which is sandwiched between the carb and velocity stack. You push or pull to open or close off the carb intake. (Chokes are manual in both cases.)

Before I discuss engine performances, one significant difference between the Enya, O.S. and Saito is that the O.S. has a mechanical geared pump which eliminates the concern for a precise fuel tank location. This pump is precalibrated at the factory and *should not* be taken apart. It ensures that fuel is delivered to the carb at optimum pressure and flow. The pump also needs a return line to the fuel tank as



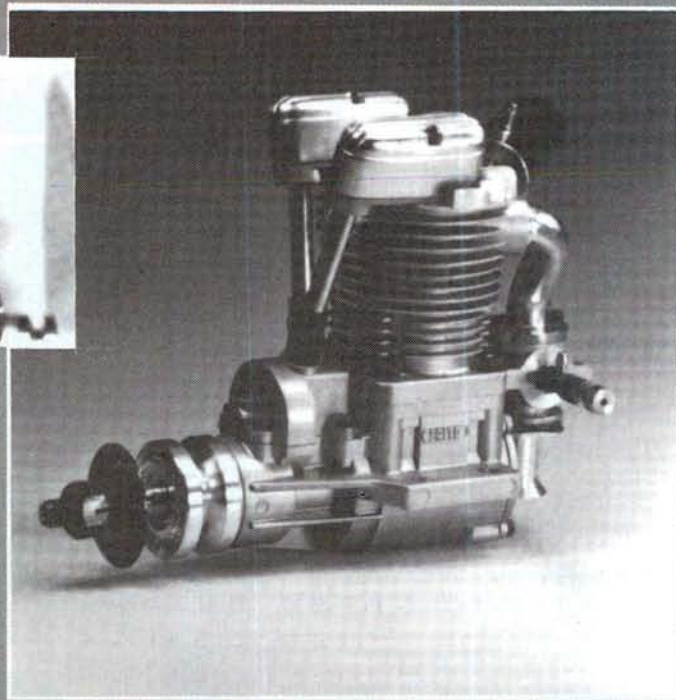
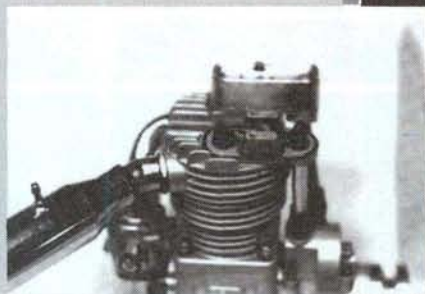
Enya's tool kit was complete but the forged wrench that comes with the O.S. gets the nod over this stamped one that came with the Enya.

excess fuel not needed for the carb is bypassed and returned to the fuel tank. A complete diagram showing proper fuel tank hook-up is in the instructions. Also, the O.S. engine is equipped with a flexible breather pipe which is on the right-hand side of the engine. This is a necessary part of the pump system as it supplies the breathing to the intake pipe. Without this pipe the pump system would not function properly.



# SAITO FA-120 SPECIAL

Left: the Saito's accessory kit was also very complete. Here again we very much liked the forged wrench. Right: unlike the O.S. and Enya, the Saito has individual rocker box covers. Access is still quite good.



Saito's included fuel filter features mesh screen in glass bowl.

**Performance.** Prior to starting the actual performance testing, all three engines were broken in following the manufacturers' recommendations. A Zinger 14x10 propeller and Cool Power 15 percent nitro 4-cycle fuel was used for all running, including actual measurement runs. Temperature and humidity levels throughout the test period were 68°F and 57 percent respectively. Each example started and restarted quickly as I followed the recommended procedures for both hot and cold conditions. Each was purposely flooded, or choked, and then hand-flipped with the glow plug disconnected to expel fuel. Again, once all fuel had been expelled, starting was easy using an electric starter.

The SPECIFICATIONS/PERFORMANCE chart contains the results of the testing. As noise continues to be a major concern to the modeling world, each engine was rated for noise level. Engines were equipped with a muffler and 14x10 Zinger prop. A sound-level meter (DB meter) was positioned perpendicular to, and at the same height as the muffler. Recordings were taken at maximum rpms. The results are shown on the AUDIBLE NOISE chart.

It's been my experience that with

longer running times rpms increase, and I think this would also be true of the 3 engines 08863.

O.S. FS-1.20 Surpass. Distributed by: Great Planes Model Distributors, P.O.

Box 4021, Champaign, IL 61820.

Saito FA-120 Special. Distributed by: United Model Distributors, 301 Holbrook Drive, Wheeling, IL 60090.

## AUDIBLE NOISE

Distance from Engine (in feet)	O.S.	ENYA	SAITO
3	109	108	105
5	106	101	102
6	103	100	101.5
8	100.25	99	99.5
10	99	98	98.5

## SPECIFICATIONS/PERFORMANCE

	O.S.	ENYA	SAITO
<b>WEIGHT</b>	945g (3#7 oz.)	910g (32.5 oz.)	830g (29.6 oz.)
<b>WIDTH</b>	45mm	48mm	47mm
<b>LENGTH</b>	127mm	134.5mm	140mm
<b>POWER</b>	2.1/12000	2.1/12500	—
<b>RPM HI/LO</b>	8800/2100	8600/2400	8600/2300
<b>EXHAUST TEMPERATURE<sup>1</sup></b>	840°F	848°F	640°F
<b>FUEL CONSUMPTION<sup>2</sup></b>	1.2 oz./min.	1.3 oz./min.	1.2 oz./min.
<b>SUGGESTED RETAIL PRICE</b>	\$500.00	\$435.95	\$299.95

<sup>1</sup>Measured inside muffler with engine at full throttle.

<sup>2</sup>At full throttle with correct needle setting.





*Fuselage assembly right out of the box! Super pre-fabrication.*

to the foresight and design of Graupner.

While we're on the subject of installations, let's get back to the engine. The plans show the O.S. FS .90 4-stroke. If you decide on the O.S. 120 twin as I did, you'll have to make a spacer to maintain the distance needed to keep the overall length as shown on the plans. This is easily accomplished by laminating squares of plywood slightly larger than the aluminum mount that comes with the O.S. 120 twin on the ply. Trace around the mount and mark mounting screw holes. Coat with epoxy and you're done. If you elect to use the O.S. 90, the O.S. aluminum radial mount will be all you need.

## FINISHING THE SUPER LASER:

Wanting something different, I looked at Coverite's\* Black Baron metal-flake iron-on covering. Photos can't do this product justice. In direct sunlight it's a thing of beauty. This covering is available in red, blue and silver on a roll sized 27x72 inches, and by the time you read this will be available in 15-foot rolls. A word of caution: keep the heat setting at approximately 280 degrees F. Higher temperatures can affect the metal-flake. The covering is easy to use if you're familiar with iron-ons and the finished result with metal-flake will have people turning their heads.

All this construction and painting takes about two weeks of evening work. The plans and instructions for the Super Laser are quite complete, and supplementary hints are given at the end of the instruction package.

O.K. folks! It's time to light the fire, kick the tire and go! The O.S. 120 4-stroke twin, which will make any modeler and machinist take notice, comes in a protective box lined with foam rubber that would be suitable for shipping a Ming vase via UPS. The accessories included are Allen wrenches, open-end wrenches, feeler gauges to set valves, a

radial mount, a set of leads for wiring glow plugs, and literature and instruction book that leave nothing out.

The O.S. fired up without any problems and the engine was broken in according to the instruction. There was no vibration and it sounded like the real thing. With throttle advancing, I turned into the wind—my heart was racing as fast as the U.S. 120 twin! The Super Laser was on roll-out and broke ground cleanly.

Flight performance of the Super Laser was predictable and solid. The aircraft is capable of doing anything the pilot is



*Balsa pre-sheathed foam core wing panel. Spar slots and servo cut-out pre-cut. Circular opening is for aileron bellcrank.*

capable of. By the way, the Super Laser performed beautifully with the O.S. 120 twin 4-stroke but a .90 4-stroke will also work well. Probably Mach 10 and just your pants smoking!

If you're just getting into R/C aircraft or still having trouble with high-wing trainers, this aircraft is *not* for you. If you're ready to move to a high-performance mid-winger, this one could fill the bill. Gentlemen and ladies, the Graupner Super Laser is a kit that I'm sure you'll enjoy building. All parts fit and match up with their respective counterparts. Give the Super Laser a try, I'm sure you won't be disappointed.

*\*The following are the addresses of the manufacturers mentioned in this article:*

*Hobby Lobby International, 5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.*

*O.S. Engines: Great Planes Model Distribution, P.O. Box 4021, 1608 Interstate Drive, Champaign, IL 61820.*

*Coverite, 420 Babylon Rd., Horsham, PA 19044.*





# ARF DIRECTORY

**W**elcome to the wide world of ARFs. We've put this directory together to show you how many different airplanes are available, and to provide you with a quick reference guide for sources.

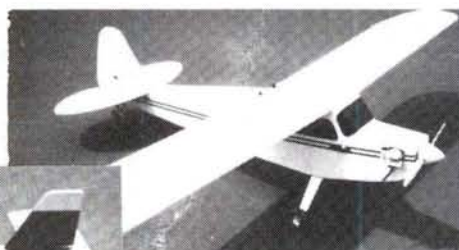
Your first reaction will probably be disbelief at the number of available airplanes! We've tried to include everything we could find that fit into the two major categories, but we may have missed some.

In fact, we're sure that our list isn't comprehensive, but we think that you'll find enough here to meet your needs.

## PRE-ASSEMBLED, READY TO COVER



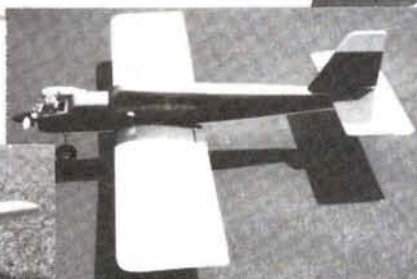
UMP Bipe MK II



Indiana Hobby Sport Cub



World Engines Modeltech Bullet



Indiana Hobby Sport Cherokee 40

### AMS IMPORTS/EXPORTS

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CAP 21

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*MRC Trainer Hawk II*



*MRC Electric Cessna*



*MRC Piper Cherokee*

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Cessna 172 (19-25)  
Spirit of '76

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Cessna 180  
Cessna Skylane 182  
Piper Cub J-3  
P-40 Warhawk  
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217 367-2069

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# Jet Blast

by RICH URAVITCH

**T**HE FORCE AIR fan unit has been advertised in all the major modeling publications, including MAN. *Jet Blast* has reported its existence and viewed its performance claims with some skepticism, while trying to be open-minded. This is an approach shared by many of our readers, and virtually all the other ducted fan manufacturers. I've long felt that the best means of determining the credibility of performance claims is to place the product in the hands of the modeler, and let him use it. He must be the ultimate judge.

Pat Grubbs, a fan fan and show team flyer from the Sacramento area, flies a Parkinson\* Regal Eagle powered by a Byrojet with an O.S. .77 and knows the airplane well. The Force Air\* folks provided him with a fan unit which he agreed to install in another Regal Eagle and test-fly for comparison, side by side with the Byrojet-powered example. The following is his guest columnist report on that activity.

## Does It Work???

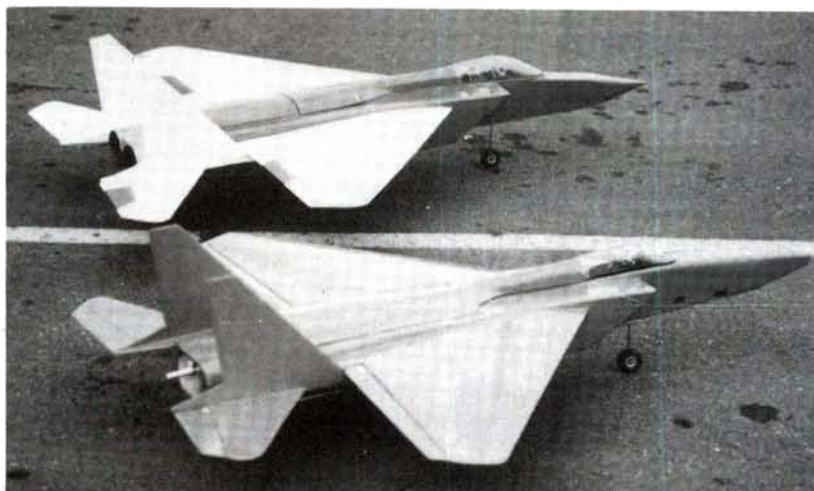
by Pat Grubbs

There's been a great deal of discussion, both positive and negative, on the Force Air 1 fan unit. Since I'm a partner in Discount R/C Hobbies, Sacramento, CA, and have a reputation of knowing jets and being area leader in fan jet sales, I was naturally asked one day: "Do they work?"

I placed a call the next day to Force Air and soon a fan unit for an O.S. .77 was on the way.



Exhaust area showing tuned pipe installation on Eagle 4.



Byrojetted Eagle 3 (top) and Force Air'ed Eagle 4 meet for fly off on November 15, 1987.

On October 5 the project began. The fan and engine had been selected. Now, the vehicle to carry the Force Air unit had to be chosen. That was a simple choice. Having built three Regal Eagles in the last four months, I chose a Regal Eagle.

This kit was chosen for several major reasons. It looks like a full-scale airplane. It's simple to build. It has plenty of room to house almost any fan unit. The price is reasonable. It has fantastic flying characteristics including speed, maneuverability and ability to fly slowly without stalling.

On October 10 the Force Air fan arrived and some basic measurements were taken. On that day the fun began, along with suggestions, hints, etc., from almost everyone who'd ever seen any fan jet fly (and from some people who'd never seen anything fly!). Someday I'll write an article on how to or how not to build an airplane in a hobby shop!

On October 12 I set a finishing date of November 15. By then I'd have the Regal Eagle/Force Air finished and flying.

The first task (Eagle 4) was to answer the question: "Where does this unit go in the plane?" The fan unit normally used was CGd, the Force Air unit was CGd and placed in Eagle 4 at the same CG as the Byron unit.

New fan mounts were designed and made after the basic fuselage box was built.

As soon as the unit was installed in the plane, a few things became obvious. The fuel tanks could now be mounted inside the fuselage rather than in the wings, using Sullivan slant/oval-type tanks. Two 10-ounce tanks were selected.

The air intakes could be totally clear with nothing in front of the fan unit to block air intake. I used 1/64-inch plywood to make very clean intake ducts.

There was great interest in my progress, and I was often asked: "Did you bench-test the unit?" The answer was always the same—No. I have no sophisticated equipment; I'm just an average modeler, who has a fan unit, and bench-testing was out of the question.

On October 26, behind schedule and knowing the 15th of November was quickly approaching, I made a rear duct from 1/64-inch plywood and installed it. The inside was coated with thinned epoxy to protect it from fuel. The fuselage design allows the fiber glass top fairing to be made removable, so all of the inside pieces are totally accessible. Besides, I wanted to see the fan turn!

Next, tail feathers were attached, wings



sheeted with 1/4-inch plywood and installed. Finally, an F-15!

An Airtronics 7SP radio was selected and seven servos were installed. (Each control surface gets its own servo.)

By November 5, right on schedule, it was time to finish the Eagle 4. Painting it slowed *me* down, but not the phone calls!

As it began to rain and get foggy, I had to turn my laundry room into a spray booth. Finally, Eagle 4 was orange. (So was my dog, my cats and my laundry!)

On November 11, four days ahead of schedule, Eagle 4 was almost ready, except for the canopy and other miscellaneous little things.

It was time to start the O.S. .77. Would it work? The day was cold for central California—about 55 degrees. By the time we started the engine it was 4pm.

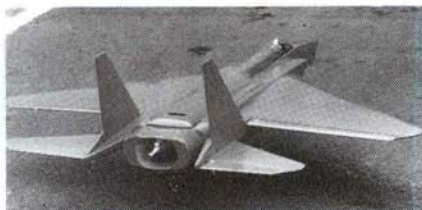
When Stuart Smith and I finally started the engine we let it warm up and then, with me holding the Eagle 4, Stuart throttled up. Lo and behold... air came out the back. How much? I don't know, but we both felt it was enough to fly the 12 1/2-pound plane. It was getting dark so we stopped for the day.

November 13: Eagle 4 was finished two days ahead of time and we were still waiting for the rain to stop.

November 15: At Woodland Flying Site two Regal Eagles were fueled and ready for testing. Eagle 3 has a well broken-in O.S. .77 with a Byron fan unit. It's been in four Capital City Barnstormer shows this year and still shows the scars from a close encounter of the worst kind... Earth! Eagle 3 weighs 11 3/4 pounds and is almost identical to Eagle 4 which weighs 12 1/2 pounds.

**Test 1:** A fish scale was attached to the back of Eagle 3 (Byron Unit) and to a post. Results: 6 1/2 pounds of pull. Eagle (Force Air) was then attached to the scale, warmed up and given full throttle. results: 4 1/4 pounds of pull.

**Conclusion:** Neither unit could pull the post out of the ground! Secondary conclusion: Neither unit pulled its advertised static thrust, if that's what the test was!



*Eagle 4 with Force Air fan unit installed. Compare to twin outlet on Eagle 3.*

Eagle 3 had Cool Power 5 percent, Eagle 4 had Cool Power 15 percent fuel. Enough high technology testing; the question was still, will it fly?

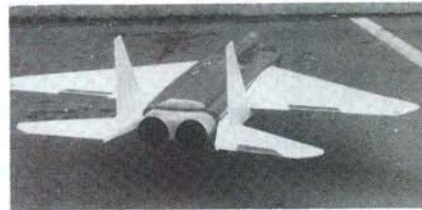
**Test 2:** 9:50am, clear weather, 50 degrees, headwind about 5 to 7mph. With Steve Brown handling the video camera, Captain Stuart Smith with the 7SP radio and me with eyes closed, Eagle 4 taxied into position and then started its run out.



*Force Air fan installation in Parkinson Regal Eagle appears tidy, accomodates twin slant oval tanks easily.*

At about 250 to 300 feet Stu rotated and Eagle 4 lifted off on its epic flight. Eagle 4 took a click of aileron trim, circled the field and then Stu began playing.

The Eagle 4 was flying at an estimated 100mph—slower than hoped, but flying. It would climb vertically, roll, turn and scream by at low altitude. The flight lasted about nine minutes. Then we tried



*Standard Parkinson Eagle with Byrojet unit. Airplane is proven performer.*

Eagle 3. Roll out about 100 feet, speed 125mph plus.

**Conclusion:** They both flew!

As you may be able to tell, I didn't get too technical in this venture. The project was started to answer the question: "Does it work?" and I've shown that it does. The Force Air 1 fan unit flew a 12 1/2-pound airplane using an O.S. .77.

I'm not going to comment as that's not my responsibility. I've reported what we did and what we found out, and all through the project I kept a sense of humor. It's fun. Let's keep it that way!

I wish to thank all the people who helped me with this. Jerry Martin, Wally Douke, Stuart Smith, Allen Craven, Steve Brown, Howard Baldwin, and many others: THANKS!

*That's Pat's story. As this issue goes to press, I've spoken with Dick Stroyers from Force Air and he informs me that they're redesigning their unit and expect the revised unit to produce the advertised 18 pounds of thrust with a hot engine. Mr. Stroyers further advised that 15-16 pounds would be readily achievable with the standard O.S. .77. He didn't offer any reason why the original unit didn't perform as claimed but assured me that purchasers of the original unit would receive the new version within 60 days. Those of you having additional questions for Pat can reach him at: MDM Co., P.O. Box 739, Rancho Murieta, CA 95683, (916) 985-6130. For peak performance, stay tuned....*

*\*The following are the addresses of the manufacturers mentioned in this article:*

*Bob Parkinson Flying Models, 3 William Street, Thornton, Ontario, Canada, L0L 2N0.*

*Force Air Technology, Inc., 9275 Trade Place, Suite G, San Diego, CA 92126.*





# Golden Age of

by HAL "PAPPY" deBOLT

**W**e receive frequent contributions to our Old Timers R/C columns; so many of you tell us about your early activities and provide info that we can pass on to everyone. But how can I get the attention of *early* pioneers? Perhaps I should make an error in a report!

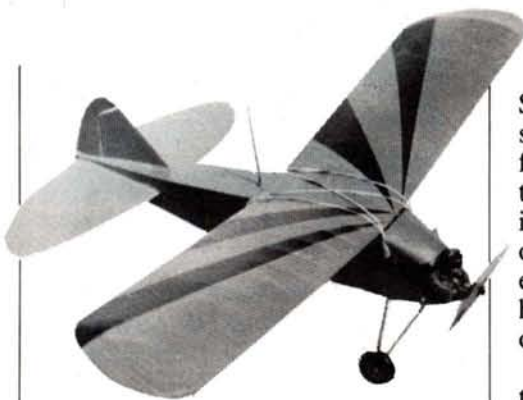
Hope you enjoyed the pix of some good-looking West Coast early birds in our August '87 issue. The photograph resulted in a nice letter from RCM's "Sunday flier," old-timer Ken Willard. Ken tells us that Colby Evett is second from left and that his friend's name is Bill Glick, not Glitch. Maybe "Glitch" sounded more appropriate to R/C! Also, the tow-headed youngster is Ken's son Don, now 34 years young and going strong.



C.E. Underhill of Model Tech Spec with Leapin' Lena. Powered by K&B .19 Greenhead. Controls actuated by Bonner compound escapement.

The model in the photo is Ken's Big Breathless of early R/C fame. The model and Ken made some interesting flights including flying across the Catalina Channel (that's ocean water!). This set one of the first R/C endurance records. Big Breathless is now in the American Modeling Association Museum.

I plan to clue you in on some of the early world records as soon as I have sufficient data. You'd be surprised at the



Leapin' Lena, span 56 inches, area 540 square inches, motor .19.

effort it took in those days and the equipment they used. Can anyone help us with info? Details of Ken's doings will be part of the eventual report.

One thing readers constantly ask for are sources for kits and plans of early R/C planes. I've noticed a small ad buried in that "catalog magazine" for a model called the Leapin' Lena, from a California-based company. I have some data on the original, dated 1954.

The Leapin' Lena was designed by Charles Underhill and offered in kit form by Model Tech Specialties of Ridgefield, CT. Wingspan was 56 inches, power .15 to .19 and it weighed 58 ounces. The stubby appearance of the model foretold its performance. Flying Leapin' Lena was not for the faint of heart! Remember this was control by rudder only! In a news release Underhill quotes from Ed Lorenz's description in *MAN*. "...The ship (?) is extremely aerobatic, will do snap rolls at the drop of a hat and continuous inside loops. Touch rudder on a spiral recovery and you get an Immelman turn. Real exciting flying with rudder only." So, if you can dig out that small ad, it may be the source of an unusual offer.

Continuing the theme, I'd like to tell you about a more popular early design. This time we were helped by Mike Gretz of Sig Manufacturing\*, who responded to our request for information on the Astro Hog. Thanks Mike!

A few issues back we described the Smog Hog, and Astro Hog is a natural sequel to that. The designer's explanation for the name is as follows: "Hog" is a tribute to Howard Bonner's Smog Hog influence, and "Astro" relates to astronomy, since the sky's the limit for the expected performance! To appreciate you have to transfer your thinking to the type of flying common at that time.

As you know, with today's aerobatic-type planes, no maneuver is impossible. Imagine what came before, especially with only high-wing configurations. Inverted flight was a struggle, and was only accomplished by paying constant attention. Any rolling maneuver, even with ailerons, was of the barrel-roll variety, rolling around an axis, not on one, as is possible today.

The best reason for telling the Astro Hog story is that here you have the *true* granddaddy of *every* low wing flying today! What was done in this one plane (designer being a real visionary) provided



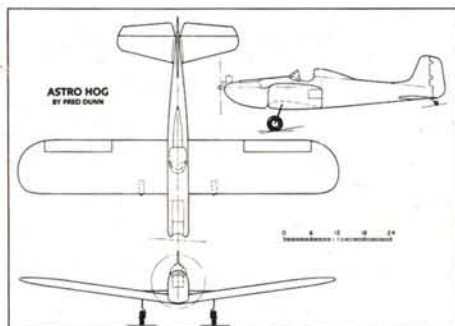
Orbit 8-channel reeds in an original Astro Hog, Bonner's first reed servo.

the basics for subsequent R/C aerobatic performance. Remember the American low-wing designs which were declared so outstanding at the first FAI World Championships? These were the *sons* of Astro Hog!





Left, visionary Fred Dunn with his second Astro Hog at '58 Nats. Hog swept first and threw fourth place in R/C aerobatics. Above, Mike Gretz's faithful replica of the original Astro Hog. A current Sig kit.



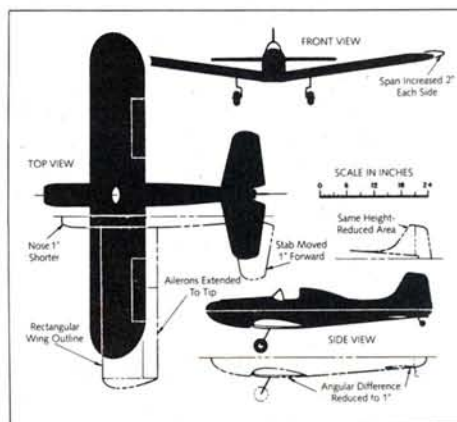
Original three view of the Astro Hog. Model was also flown U-control.

During the '40s, there was an active group of modelers in Warren, Ohio. Remembered are Fred Dunn, Howard Thombs and John Maloney (bless his recently departed soul). For C/L Fred had designed a cute and unusual profile bi-plane, aptly named the "Di-Do." It became famous when Howard Thombs won an Olathe Nationals stunt event flying two "Di-Dos" simultaneously! The interest in it resulted in a kit which sold well. Fred eventually moved to California and became involved with the very active Larks club and imaginative modelers like Bonner, Ray Downs, Bob Dunham and company. So, he was right where most of "the new" in R/C was happening, and as a visionary, Fred fit into the group well.

As the story goes, the Larks were off to the '57 Philly Nats where Dunham would top deBolt by half a point to win with his modified Smog Hog. Fred was disappointed at not taking the trip, so he stayed home vowing to design the ultimate plane for R/C aerobatics. Apparently, one promising attempt at a low wing had already been made but with no real success. This pointed Fred back to basics and when the troops got back from Philly, Fred had the Astro Hog designed, built, and ready to test-fly.



Graupner "Bellomatic" servo first used the "Micro-mo" motor. Modern appearance in the 50s!



Bob Dunham's first place multi-winning Astro Hog had many modifications.

Initial test flights were made by Howard Bonner at a local meet on August 17, 1957. It really flew and Howard just about split his sides with joy marveling at the performance. Before the day was done all the leading Larks pilots had taken their turn, and the applause each received was a tribute to the Astro's capability. The R/C aerobatic future was born so quickly.

Within a few weeks flyers like Bonner, Dunham, Downs, etc., were all sporting their own Astros. The Astro Hog craze was on, with modelers all over the country (and the world) posting wins with this new plane. Topping it all would be Dunham's '58 and '59 wins with his modified version. It's conceivable that the Astro Hog could have been the first World Champion! There's never been another aerobatic design so widely used and without a readily available kit!

With this first venture with the low-wing concept, Fred was as concerned about structural integrity and strength as

(Continued on page 115)





# R/C News

by ART SCHROEDER

**H**OW MANY MODELERS dream of easing into a seat in their favorite model, taking off into the wild blue yonder and putting that home-built effort through its paces? I guess we all have that feeling from time to time—sort of a Walter Mitty aspect of our hobby! Of course, we know our airplanes are miniatures so the dream never lasts long. However, occasionally our models are translated to full scale, and Maxey Hester of Sig Manufacturing\* has done just that, so realizing our dream.

The airplane in question is the now well-known Sig Spacewalker—a 1/3-scale version of the full-size home-built designed by Jessie Anglia of North Carolina.

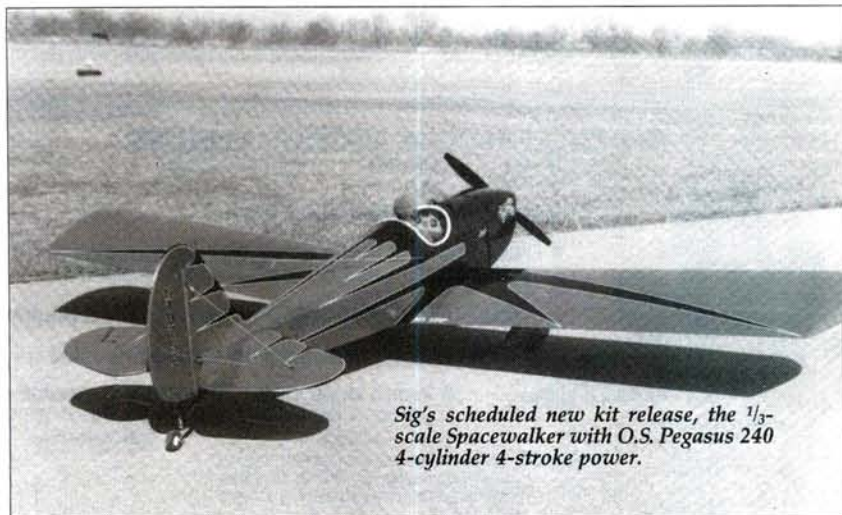
Maxey flew the model to fifth place in Giant Scale at the latest Nats and also demonstrated the airplane at Byron's recent Aviation Expo. The model uses an OS Pegasus 240 4-cylinder 4-stroke engine. Although I haven't yet seen the kit, I know it will rival (perhaps exceed) recent Sig releases. If so, it'll be a winner. I haven't ever seen a better flying giant-scale.

However, the big news is that Maxey Hester has also flown the full-scale version that he built over a six-month period. At the time of this writing, he's nearing 20 hours of flight time leading toward certification of this airframe. In its full-scale version, Spacewalker has a welded tube fuselage and tail feathers. It also has a built-up wing made principally of various wood plys and stock. Engine is a Continental 65, and covering is Dacron finished with a water-based urethane.

Reports say that the full-size bird flies as well as the model! Or, should it be: the model flies as well as the big one? Suffice to say, both fly well.

The Sig team must like this bird since another full-scale Spacewalker is under construction and a number of the models are ready to go.

The model is exactly to scale except for an airfoil change, but I've learned that the model and the newest full-size bird will



*Sig's scheduled new kit release, the 1/3-scale Spacewalker with O.S. Pegasus 240 4-cylinder 4-stroke power.*

employ the NACA 2415 airfoil which will put everything in perfect scale.

New products from Sig are always exciting, and this latest-model/full-scale exercise is one of their most interesting developments. After all, how many manufacturers own the big bird that they also offer in model kit form?

**A Potential Danger...** Over the past few years, I've read monthly the newsletters of over fifty R/C clubs in both America and Canada. There's one recurring problem that concerns Ni-Cd charging and what can happen if something goes wrong. The most recent reference was in "ERCS News," the newsletter of the Edmonton Radio Control Society

edited by Gerry Van Dyk. "...The other incident we've heard of was in the home of Alex Svatos. Those who know Alex, know him to be a particularly safety-conscious individual. He went to charge a 225mAh battery pack in his basement, using the resistor supplied with it to charge with the standard 50mAh charger. Five minutes later he heard a loud "pop" from the next room and saw a glow. The pack was on fire! Fortunately, he'd removed it from the airplane before charging, but he had all the standard modelers' items around: glow fuel, paint, thinners, etc..."

A year ago, no less a personality than Walt Moucha, of Balsa USA, lost his entire house as a result of a fire started by



*No, not a 1/3-scale Maxey in the cockpit! Full scale Spacewalker. Tough to fault Maxey's documentation.*



## R/C NEWS

battery charging. Fortunately, no one was hurt. While such accidents may be rare, they can be so devastating that we should all be aware of this danger. No one wants to place families and homes in jeopardy.

I now remove my airborne packs from charging when I'm free to observe the process, and I've totally eliminated the usual unobserved overnight charge. If something goes wrong I'm there to take care of it. I've confined all charging to an area containing no other inflammables.

Think of a soft balsa framework, perhaps soaked with oil and covered with inflammable paints. One problem with an overheated battery pack in such a situation could spell disaster.

While I'm sure that most modelers have never experienced a problem with this, I'm just as sure that Walt Moucha never had such a problem either! It only takes a one-time happening, so why take needless risks?

I don't know why these fires sometimes happen. Perhaps it's a shorted pack, or some unexpected problem with the charg-

er. If you've ever experienced a problem with an overheated pack, please let us know. This is one safety problem that *can* be solved!

**Useful things...** I'm finishing a Byron BD-5J and a full report will appear in the next month or so. I can tell you that this is a fine kit, and based on my observations, a great flying fan jet!

However, the one product that really caught me was the OS 77 powerplant that I have in my BD-5J. This is a beautifully built engine that, despite its impressive power output, is really easy to handle.

As I usually do, I first used the engine with just a propeller, and I recommend this to any fan "fan." Trying out a new engine inside a plane isn't a good idea, as you first need experience and lots of cooling air that only a prop will provide.

The OS 77 on the Byrojet fan doesn't need much nitro (10 percent is fine) to garner copious amounts of thrust. This is a fine engine that, if treated correctly, will give you hours of top-notch operation. Treating it correctly should include regular maintenance at the end of each day's flying. Ever since I turned the main bearings of a popular 4-stroke to pure rust, I've been using after-run oils!

One of the best oils I've found is PIC's\* (Penn International Chemicals) Metal Max. Just a few drops in the carb and glow-plug hole keeps everything clean when worked in. Metal Max is very low-cost insurance for our very high-cost engines.

All BD-5J surfaces are covered with Coverite's\* Black Baron heat-shrink plastic covering. It's easy to apply, shrinks to a permanent set, can be applied directly to foam and, once set, remains in place. Try it. Paint used was Coverite's Black Baron Epoxy. Ever since I started using this spray-can enamel, I haven't pulled out my spray equipment. The material goes on smoothly and dries to a durable, glossy finish that really stands up to glow fuel.

The Byron BD-5J kit has some fascinating features. It's the third fan-jet I've tried, and has an optional thrust attenuator that kills thrust by closing the jet exhaust hole. This permits much higher, more reliable idle settings and the opportunity to put an engine on the pipe before takeoff. I haven't tried it yet, but it looks great on the model. It should be interesting!

The BD-5J is a typical Byron kit with fiberglass fuselage and molded foam wings; tail surfaces are built of sheet balsa. I've reviewed a half-dozen Byron

(Continued on page 115)

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JT-601 .45-.60 19.00  
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- Tubes point to head
- on inverted engine or
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#### UPRIGHT ENGINE

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JT-602 .45-.60 19.00  
JT-902 75-13 21.00

- can be used on left
- side exhaust for HELICOPTERS
- right side on BOATS.



#### INVERTED ENGINE

JT-403 .19-.40 18.00  
JT-603 .45-.60 19.00  
JT-903 75-13 21.00

- can be used on right side
- exhaust for HELICOPTERS
- left side on BOATS.



#### UPRIGHT/SIDE/INVERTED

JT-404 .19-.40 18.00  
JT-604 .45-.60 19.00  
JT-904 75-13 21.00

- can be used for PITS
- style and on BOATS.



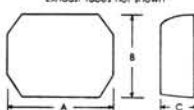
#### UPRIGHT/SIDE ENG.

JT-405 .19-.40 18.00  
JT-605 .45-.60 19.00  
JT-905 75-13 21.00

- can be used FOR PITS
- style and on BOATS.

**INCLUDES:** Exhaust pipe extensions with clamps, worm drive clamp, muffler alignment plate, gasket and mounting screws

#### BASIC DIMENSIONS



	A	B	C
19-40	1 3/4	1 3/8	1 1/16
45-60	2 1/8	1 3/4	7/8
75-13	2 5/8	2 1/8	1

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**K&S**



# INTRODUCING THE FOX 40RC STANDARD THE EASIEST STARTING THE MOST USER FRIENDLY THE MOST POWERFUL LOW COST 40 RC YOU CAN BUY

Compare these specifications and you will see why your next 40RC should be the new Fox 40RC Standard. However, nothing we can say in this advertisement will be as convincing as flying one. We urge you to make your next 40RC a Fox 40RC Standard. You will be happy that you did.

**\$79.95**

#24096



Motor	RPM with muffler 10-6 rev-up	Hand start ability cold	Hand start ability hot	Was motor test run and adjusted?	advertised list price is	Main bearings	Piston mat. & cyl. mat.	Weight with muffler	Does it have the tilt up-tilt down muffler option?	Does it have a replaceable prop stud?	Does it have a wrap around thrust washer?
Fox 40 Standard	12,900	Excellent	Excellent	Yes	79.95	Two Ball Bearings	Iron Steel	11 1/4 oz.	Yes	Yes	Yes
O.S.F.P.	11,200	Fair	Poor	No	92.95	Bronze Bushing	Iron Steel	10 1/2 oz.	No	No	No
Magnum	11,400	Fair	Poor	No	74.95	Bronze Bushing	Alum. Nickel Plated Brass	10 1/2 oz.	No	No	No
Royal	11,700	Fair	Poor	No	84.95	Two Ball Bearings	Alum. Nickel Plated Brass	14 oz.	No	No	Yes
K & B 45	12,200	Fair	Fair	No	79.95	Cast Alum.	Cast Alum. Plated	14 1/2 oz.	No	Yes	No

The motors used in above test were all bought on the open market and presumed to be typical specimens (except Fox). Fuel used was Duke's Fuel (10% nitro). The Fox used in above test was the poorest of 4 selected.

The Fox 40RC Standard is identical to our Delux 40 except that the spinner is omitted and the Standard is fitted with a steel liner and iron piston. With 40 years experience we have developed the iron piston to a fine art. Our piston grind geometry and cylinder grind geometry results in better compression hot and cold than our competitors'. The oil absorbant nature of the iron we use is unexcelled. This series motor is fitted with a larger diameter wrist pin for long life.

The metal used in our castings is harder and stronger than the metal used in most. This means better crash resistance.

Our crankshafts are made from 8620 steel and carburized. The crankpin is finished before hardening instead of after which grinds off the hard surface. Our carburetor has over .100 in out travel which gives better midrange control.

Building a fine motor is only part of user satisfaction however. The availability of parts, repair service and information is equally important. You can call 501-646-1656 and talk to someone who is knowledgeable about your motor. If you need parts and give

us your VISA or MasterCard number, the part you need will be on the way in 24 hours. If you feel you need factory service you can send your motor to us with the confidence that it will run right when you get it back, and that even in the case of the worst crash you will not be charged more than 1/2 the list price of a new motor. Please give one of these a try. We think you will be happy that you did.

Fox makes many other fine products for model airplanes. Write or call 501-646-1656 for our catalog.



**MANUFACTURING CO.**  
5305 TOWSON AVENUE  
FORT SMITH, AR 72901  
PHONE (501) 646-1656



# Pattern Matters

by MIKE LEE



*Larry Wolf's F-86 ducted fan from his Jet Hangar Hobbies kit. Author got his thrills taking a test hop on this bird. Performance is great.*

**T**HIS MONTH I'll tell you about a recent novel flying experience I had with Mr. Larry Wolfe. For those of you who don't recognize this name, Larry is one of the leading forces behind the development of ducted fan aircraft and owner of Jet Hangar Hobbies\*.

At a recent airshow demonstration at the Miramar Naval Air Station in San Diego, California, Larry showed up with two fine examples of his F-86 Sabre ducted fan jets. Having always been one

to stand and gawk at these howling marvels, I was absolutely thrilled when Larry asked me if I'd like to take one up. Silly question! I've always wanted to try one of these babies out to see what they're like.

Larry's F-86 was as solid as any normally propelled model. Having watched many examples of jets literally staggering their way through the skies, this flight completely eliminated the idea that all fan jobs fly on the verge of a stall. The F-86 had solid control with really

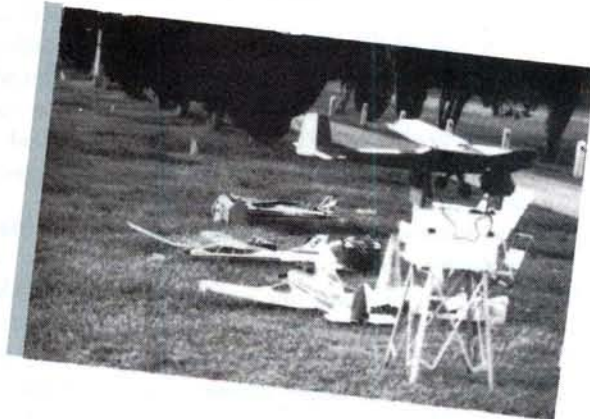
good vertical performance—not as great as a screaming YS on the pipe that accelerates going up, but this was still much better than most standard 40-size sport jobs. Even at low speed, the F-86 was rock-solid.

As Larry himself describes the planes: "Both of the F-86s flown here are from Jet Hangar Hobbies kits, and are powered by the Turbax III ducted fan units. Larry's is powered by a K & B .67 prototype engine and the other, by Steve Cantrell, is powered by an OS Max .65 VRDF. The



*(left)  
Pete and Robin Olsen concentrate on the Novice pattern while judge Rene Grebe (standing) and Harry Apoian standby.*

*(right)  
ARFs, scale, and sport trainers lined up for flying in a low pressure pattern meet for newcomers.*





finish is chrome MonoKote in the classic SKYBLAZERS decor."

Although this wasn't pattern-related, I had to tell you about it to show how far these types of aircraft have come. They may now be flown by the average sport pilot and will fly as well as any sport aircraft. It was a thrill for me, and an experience which has changed my mind on the subject of ducted fans.

Getting back to pattern; I also had the occasion to watch an interesting contest held in Chino, California, by the American Model Airport Association. This was a pattern contest for newcomers. The idea was to introduce precision aerobatics to pilots who'd either already flown in a pattern contest but needed further experience, or who had previously flown only as novices.

The pattern to be flown was simply the standard AMA pattern for novices. In order to provide more ease in performing the maneuvers, the pilots were allowed to perform the maneuvers when *they* were ready, making as many free passes as they needed between stunts. This relaxed the pilots and provided them with the best chance of executing a maneuver directly in front of the judges. The format worked really well, and pilots were able to not only perform in a relaxed manner, but also to laugh about their flights while they were in progress.

The judges were Harry Apoian and Rene Grebe, who are experienced pattern pilots. They provided valuable feedback

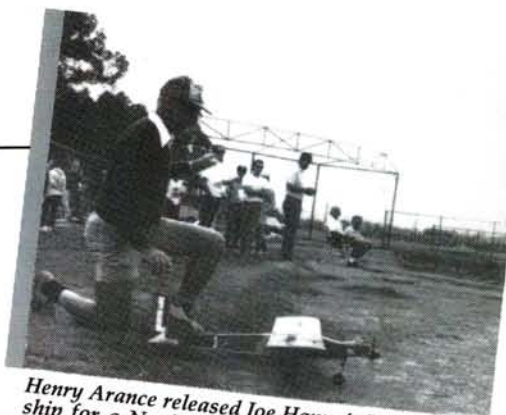
to the pilots just after the flights for the benefit of the new pattern jocks. In between rounds, both judges provided an overall flying critique and answered pilots' questions. This obviously helped the pilots, as flight quality improved with every round.

As far as the aircraft requirements go, the pilots were allowed to fly what *you* have. Only one genuine pattern bird showed up, without pipe and retracts. All other birds were standard, ranging from a scale AgWagon cropduster to ARF jobs and high-wing trainers. Never mind that this was a pattern meet, these pilots were here for the education.

There were two classes of winning pilots in this event. Winners in the first class of experienced pilots were Tom Osborne in first place, Henry Arance in second and Andy Rodriguez in third. The Newcomers Class was taken by Marco Van Viegen in first place, Mike Schrader in second and his brother Robert Schrader in third. By the way, the one pattern bird that was there did not finish in first; a sport bird took first in both classes. I thought this was an excellent way to introduce precision aerobatics to pilots. The key was an easy maneuver sequence, no pressure, and solid advice from experienced pattern pilots. Maybe your club could do the same?

I tried the newest type of hinge on the market—the Easy Hinge, available from Sig Manufacturing\*. These hinges are

(Continued on page 117)



Henry Arance released Joe Hanna's EZ Combat ship for a Novice pattern flight. It was a "fly what you have" meet.



Mark Schrader flies for judge Harry Apoian, who points out a tip to Mark. Mark and Harry were at a pattern contest for newcomers to pattern.



Robert Schrader gets in a laugh as he performs the Novice maneuvers. Andy Rodriguez assists.



Andy Rodriguez has it going for the judges during his flight. Andy finished third in this meet.



Andy Rodriguez showing how its done; consistency got him third place.









# About Those Engin

by JOE WAGNER

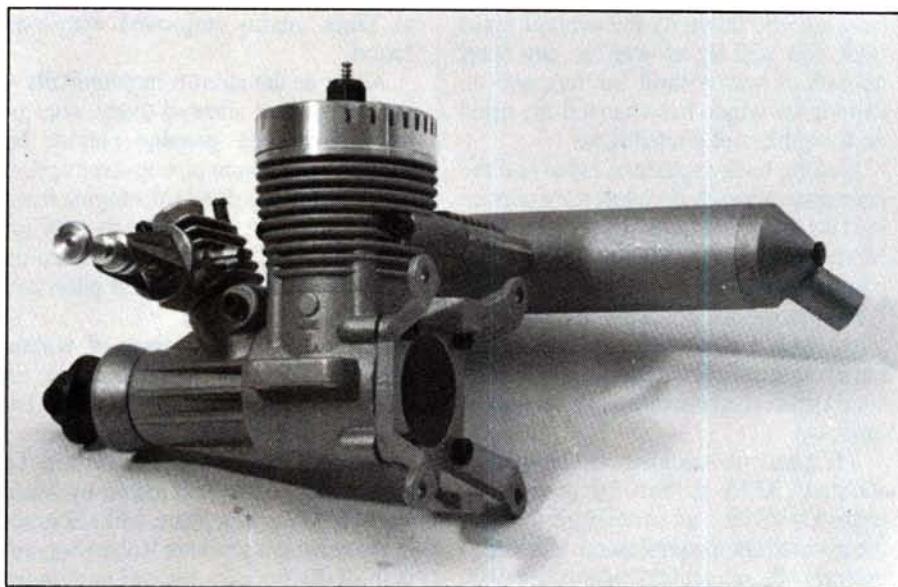
**I**RECEIVE A LOT of mail from readers, and most of them ask questions. I always reply personally, because I know that the writers prefer an immediate answer to one published in the magazine some months later. Besides, many of the inquiries are too specialized to be of much general interest; identification of an obscure model engine, for example.

A few readers have problems that might even be embarrassing to have attributed to them in print! For instance, I recently received a long letter from a reader who was having a problem with a certain popular R/C engine. He just couldn't get it to run properly. He'd checked his fuel tank and lines, changed glow plugs, fuel, and even the propeller—all to no avail. Every time he got his engine started and tried to adjust the needle valve, the motor would die.



Champion's "V-2" miniature spark plug has been out of production for decades, but now there are new sources for this size plug.

I wrote back suggesting all the possibilities I could think of: bent needle, air leak into the crankcase, and so on. In a few days I got a reply from the modeler, saying that he'd found out what had been causing his problem. He was a newcomer to model airplane engines, and had misunderstood the way the needle valve worked. He'd been turning it in the wrong direction!



One of K&B's new "sportster" R/C engines, manufactured on the new computer-controlled machinery. Note included radial mount.

However, from time to time I get letters on topics of general interest to *MAN* readers, and I'd welcome more! A recent one from Ralph Pearson of Falconer, New York, described in detail how he ruined a pair of very good R/C motors in his twin-engine model.

Like me, Ralph doesn't use an elaborate field box, with electric fuel pump, etc.. To fuel his twin he employed a rubber bulb-type filler, like those once commonly used for U-Control models. But Ralph's glow fuel attacked the supposedly fuel-proof rubber bulb, and was seriously contaminated.

The stuff that dissolved into his fuel fouled Ralph's twin motors. There was a carbon build-up in the combustion area, and other interior areas were covered with an orange residue. Performance dropped way off, and Ralph isn't sure if the motors can be repaired without replacing their pistons and sleeves.

Unfortunately, Ralph's experience with the "guaranteed fuel-proof" bulb isn't unusual. In the old days, when glow fuel contained only castor oil, methanol and

nitro-methane, rubber fuel filler bulbs worked well. But now that exotic detergents, anti-foaming agents, synthetic oils and "lubricant enhancers" are added to most modern glow fuels, you can't trust a rubber bulb anymore.

What should you use if you don't want to go the electric fuel pump route? I use an empty one-pint polyethylene shampoo bottle to fuel my small-engined airplanes, and Sig's\* air-pressure type Quick Fill pump for my larger models.

The Sig pump fits onto a plastic fuel jug, adding only a little extra weight and bulk. It won't pump fuel *out* of a tank, but otherwise it's as good a fuel pump as any electric one I've ever seen. The price is about \$7 without the plastic jug, or around \$8.50 including a gallon-size jug. Quart and half-gallon sizes are also available.

A few months ago I discussed various methods of cleaning model engines. I mentioned that I'd heard about a "miracle solvent" capable of removing even the dark brown, baked-on deposits from the head of a heavily used Fox .35. However,



I hadn't been able to find and test any of this magic stuff.

Since then several readers have written telling me where to buy this product: Sunbeam's "Metal Klean"—also sold under the name of "Grill and Fry Pan Cleaner." Jack Johnson of Lansing, Michigan, kindly sent me a can of "Metal Klean" and the address of a dealer who sells it mail order.

I usually recommend only things that I've tried, and I haven't used "Metal Klean" yet. All my own engines are clean, and although I asked around among local modelers and hobby shops I couldn't find even one truly filthy, carboned-up engine to give "Metal Klean" a rigorous testing.

However, several modelers whose opinions I respect have highly recommended the Sunbeam cleaner. For example, Bob Arthur of Libertyville, Illinois, who's one of the original members of the Model



*Sig's air-powered fuel pump: seal its vent tube with your thumb, squeeze the bulb a few times, and it fills your tank quickly.*

Engine Collectors' Association (MECA) which I organized in 1959. Bob has used "Metal Klean" to restore many old-time model engines, and he says it's great stuff.

So I'm passing along the information that Sunbeam's "Metal Klean" can be purchased from Rapid Appliance Service\*, which has kindly offered us a "modeler's special" deal on this product:

\$3.10 per can (7 fluid ounces), plus UPS charges of \$2.50 for one to six cans, or \$3.50 for any quantity over six cans.

Over the past couple of years I've had many inquiries about where to obtain model engine spark plugs—particularly the hard-to-find 1/4-32-size that was so commonly used in the 1940s on Ohlsson 23s, Forster 29s, Bantam 19s and similar spark ignition engines.

These spark plugs have been difficult to locate for quite a while. However, there are now two sources of newly manufactured 1/4-32 plugs: Coles' Power Models\*, in Ventura, CA, and Bert Streigler\* of Houston, TX. Tell them Joe sent you!

Last August I was back in southern California and had the chance to visit my old friend Johnny Brodbeck Sr. at K & B Manufacturing. He's retired from active management of the company now, and his son, John Jr., runs the business. However, Johnny still maintains his office at the factory and keeps in touch with everything that's happening. He invited me to take my camera with me when I visited the K & B plant, so that I could take any photos I wanted.

I did take my faithful old Pentax K-1000 along, but something went wrong with the flash and I wasn't able to take any pictures. There was nothing spectacular to photograph anyway, as K & B is now almost totally automated, with the very latest numerically controlled machinery. It's marvelous equipment, capable of astounding precision and speed, but it's far from being photogenic.

The machines are completely enclosed to ensure a constant internal temperature. From the outside they look no more impressive than big green boxes with a window or two on the sides.

However, the products they make are amazing. It's no longer necessary for K & B to lap pistons or hone cylinders by hand, as they once did. The new equipment makes every engine part so precisely that

it fits just as it comes off the machine. K & B has so far invested over a million dollars in their numerically controlled machine tools and the results are well worth the investment. The latest K & B engines are as good as any model motors made anywhere in the world, and are getting even better!

Foreign-made model engines have become highly popular here during the last 20 years because of their low prices and high quality. This has taken a terrible toll of American model engine companies. From 1933 to 1963 there were 142 U.S. manufacturers of model internal-combustion engines, but today there are only three: Cox, Fox, and K & B.

Let's give them our support! The quality of their products is excellent, their prices are reasonable and they provide service that's unsurpassed by any foreign model engine importer. It's time to buy American!

*\*The following are the addresses of the manufacturers mentioned in this article:*

*Sig Manufacturing Co., 401 S. Front St., Montezuma, IA 50171.*

*Rapid Alliance Service, Inc., 1454 East Michigan Ave., Lansing, MI 48912.*

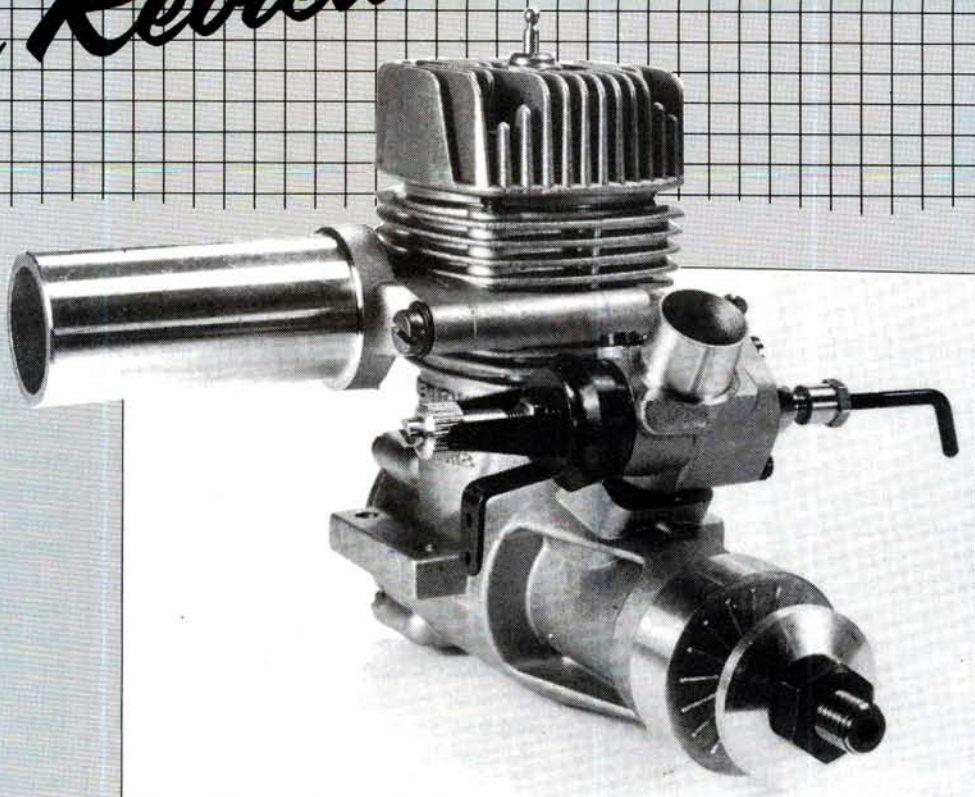
*Cole's Power Models, P.O. Box 788, Ventura, CA 93301.*

*Bert Streigler, 5831 McKnight, Houston, TX 77035.*



# Engine Review

NEW  
VERSION  
OF THIS  
POPULAR  
MARQUE,  
AIMED  
DIRECTLY  
AT THE  
SPORT  
FLYER



## SUPER TIGRE G.40 & .49

### SPECIFICATIONS

**Type:** Air-cooled, single-cylinder, side-exhaust 2-stroke-cyle, with crankshaft rotary-valve and Schnuerle scavenging.

**Bore:** 20.4mm—0.8031-inch (G.40); 22.5mm—0.8858-inch (G.49)

**Stroke:** 20.0mm—0.7874-inch (both models)

**Displacement:** 6.537cc—0.3989 cubic inch (G.40); 7.952cc—0.4853 cubic inch (G.49)

**Nominal Compression Ratio (full stroke):** 9.5:1 (G.40); 10.5:1 (G.49)

**Speed Control:** Super-Tigre Mag type adjustable automatic mixture control carburetor.

**Checked Weights:**

354 grams-12.5 ounces (G.40 less muffler)

463 grams-16.3 ounces (G.40 less muffler)

344 grams-12.1 ounces (G.49 less muffler)

453 grams-16.0 ounces (G.49 less muffler)

**Mounting Dimensions:**

**Crankcase width:** 33.5mm

**Length from prop driver face:** 85.0mm

**Height above C/L, less glowplug:** 70.0mm

**Mounting hole spacing:** 42 x 19mm

**Manufacturer's claimed power output:** To be announced.

**Manufacturer:** Super-Tigre s.r.l., Via Del'Artigiano, 29, 60065 Pianoro, Bologna, Italy.

**U.S. Distributor:** Great Planes Model Distributors Company, P.O. Box 4021, Champaign, IL 61820.

by PETER CHINN

**D**URING 1987, in the *MAN* engine round-up and test articles, we dealt with nine 4-stroke engines, three twin-cylinder motors, a flat-four and a 5-cylinder radial. These, some of them highly complex pieces of machinery, provided material for interesting study and, I hope, interesting reading. But most of these engines were pretty expensive. There were only seven single-cylinder 2-strokes and only three of these were aircraft engines of less than 0.50-cubic inch displacement.

Yet the industry tells us that the .40-cubic inch 2-stroke remains the most popular of all types of engines sold for model airplane use. Certainly, in the years since Duke Fox introduced the first one in 1961, a lot of 40s have been produced (see our historical survey in the May 1987 *MAN*) so maybe it's time to look at one or two of the more affordable recent additions to the market.

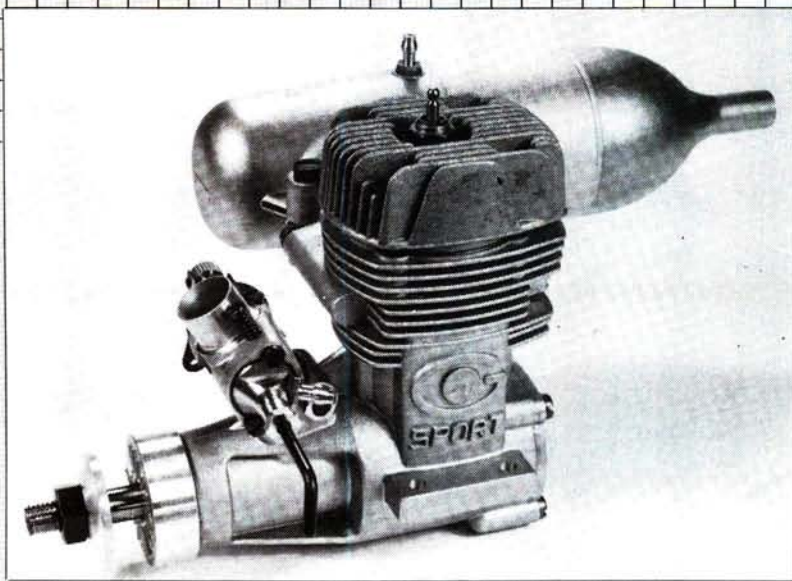
Well qualified, in both respects, is Super-Tigre's new G.40 Sport. The first thing to be said about the G.40 Sport is that it has absolutely no connection with the previous Super-Tigre G.40 which, in fact, first appeared more than twenty years ago.



Not only is the G.40 Sport totally unconnected with earlier G.40s, it also owes little to other more recent Super-Tigre engines. It's a completely new model and is coupled with a companion model, the G.49 Sport, which puts Super-Tigre into a displacement group (7.9cc or 0.49 cubic inches) not previously occupied. The nearest was the 8.3cc ST.51 and Como 51 models.

To all external appearances, the G.40 and G.49 are identical. Both engines are based on the same castings, which is common practice in the case of, for example, .40- and .45-size engines, but less so in more widely separated displacements like .40 and .49. There are three ways in which displacement can be enlarged: by increasing cylinder bore, by lengthening piston stroke, or both. Technically, the latter may be the best approach, but is not the most favored in terms of production costs. If one of the first two has to be chosen, an increase in cylinder bore is the most effective since a 10 percent increase in stroke will increase swept volume by an equal amount, whereas a 10 percent increase in bore will produce a 21 percent enlargement.

In the case of these new Super-Tigre models, the 40's

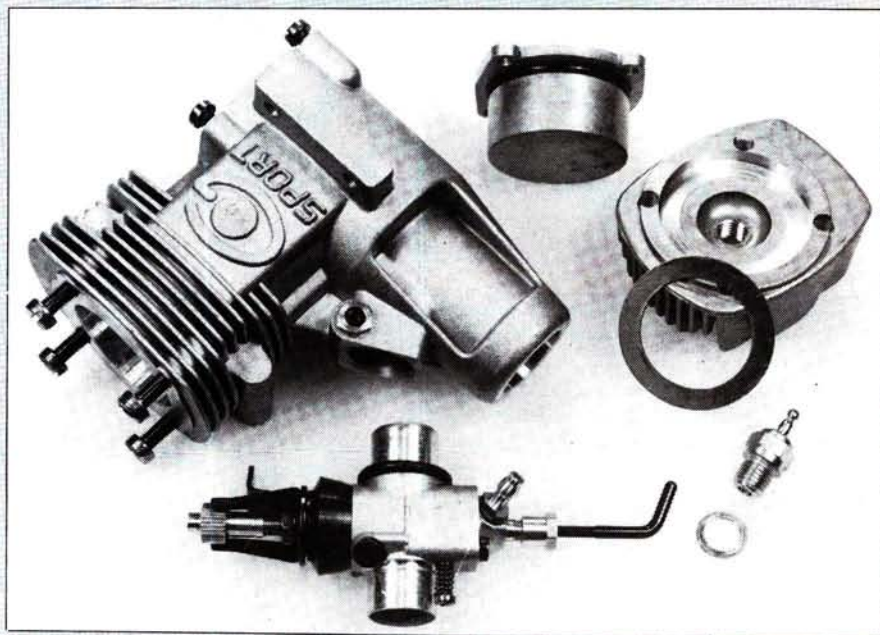


*Appearance of the Super-Tigre G.40/49 Sport models is quite distinctive, particularly as regards cylinder finning and front end treatment.*

cylinder bore has been increased by 2.1mm (just under 10.3 percent) and this has increased swept volume by over 21.6 percent. This variation is comfortably accommodated within the new main casting by boring the cylinder casing 25.5mm instead of 24.0mm and by reducing the wall thickness of the cylinder liner from 1.8mm to 1.5mm.

The same crankshaft is used for both models. It has a 15mm o.d., a 10mm bore gas passage fed from a rectangular valve port 13mm long, and a 6mm-diameter crankpin. Although this means that the crankshaft counterbalance has to cope with different reciprocating weights, the 49 piston and wristpin assembly is only 1.5 grams heavier than that of the 40. Both pistons are of the ringless aluminum type and run in brass cylinder-liners having an all-over nickel-based plating. This combination marks a departure for the Super-Tigre factory which, of course, pioneered the use of ringless aluminum pistons in non-ferrous cylinders when it introduced the original 'ABC' (aluminum-brass-chrome) setup. Incidentally, of the two sample engines examined, the G.49 also had a nickel-plated crankshaft, in contrast to the G.40 which had the usual selectively case-hardened shaft.

The G.40 and G.49 are the least expensive Super-Tigre engines in their particular displacement groups, but they are by no means inferior. The most obvious concession to economy is their use of a single ball bearing, instead of the



*Body casting is sturdily proportioned. Also shown here (clockwise) are crankcase-backplate, cylinder-head and gasket, glow plug and Mag type carburetor.*





15mm crankshaft rotates in one ball bearing, plus plain outer bearing. Ringless piston runs in nickel-plated cylinder-liner.

two ball bearings common to all other current Tigre crankshafts (with the exception of the little single-bearing X.11 and the massive 3.6-cubic-inch Twin 60 which has four ball bearings).

The ball bearing used is a 9-ball steel-caged 15 x 28mm, located at the rear and supplemented by a short outer bushing in the front end of the one-piece body casting. Whereas in a twin ball bearing engine the front bearing takes the thrust loading and also the rearward axial loading when a pusher prop or an electric starter is used, it's the rear bearing that takes the forward thrust loading in a single ball bearing engine. It then becomes necessary to provide a bearing surface between the prop driver and the front end of the plain bearing length for rearward loading. As the Sport 40 and 49 use a diecast aluminum prop driver, a steel washer is installed between the two soft surfaces to prevent excessive wear. *Don't remove this washer.*

The body casting is of sturdy proportions and distinctive design, particularly the unusual treatment used to stiffen the front end, and the asymmetrical finning designed to carry away the extra heat that otherwise builds up at the rear of the cylinder.

The cylinder head is of equally distinctive appearance, with very deep, tapered vertical cooling fins. As with all recent Super-Tigres, the combustion chamber portion of the head does not drop into the cylinder bore. Instead, the cylinder liner extends upward sufficiently to contain only the full stroke of

the piston, and the head sits on top of the liner flange, separated by a 0.2mm copper gasket, with the bowl-and-squishband combustion chamber immediately above.

These engines have an orthodox Schnuerle-scavenged porting layout with an angled inlet port each side of an unbridged exhaust port and an upwardly inclined third port diametrically opposite. Four 3.5mm slot-head screws pass into the main casting and hold the head and liner in position.

The carburetor is one of the well-established "Mag" family of Super-Tigre carbs, featuring adjustable automatic mixture control via a second needle. This particular version has a 7.5mm venturi throat and a 4mm-diameter spraybar which restricts effective throat area to approximately 16sq.mm. While this may slightly curtail top end performance, it should ensure good fuel



G.40 and G.49 Sport engines come complete with ST. "Swinging Muffler." Large volume expansion chamber can be "swung" on outlet pipe to best position.

draw and easy adjustment for the sport flyer.

Both engines come complete with a Super-Tigre Swinging Muffler. A stub exhaust pipe, having a machined 20mm o.d., is bolted to the engine's exhaust stack and the muffler is clamped to this, where it can be rotated to the angle most appropriate to the intended installation. The muffler is the intermediate-size one. It has a very generous volume of 110ml and an outlet area of 44sq.mm. and should not, therefore, cause excessive power loss.

in the May '87 issue of Model Airplane News. *The article should have said "...now challenging K&B supremacy," and not "...not challenging K&B supremacy."*







FC

# FLOATER

by ED KUDIRKA

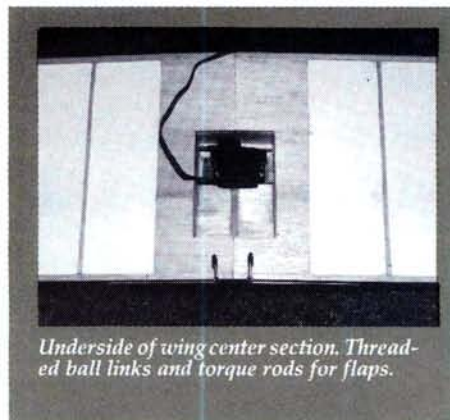
INEXPENSIVE COMPOSITE  
MATERIALS KEEP DOWN  
THE COST AND WEIGHT  
OF THIS SCALE-LOOKING  
BEAUTY.

**H**MM... RUSTY on the old gimbals... need a top-winger... something that will float around on those lazy Sunday afternoons. Friend of mine has plans for a Telemaster... Naw, think I'll borrow its airfoil section, but I'd rather design something with stringers that won't go all wiry when the heat gun hits the covering material.

There's gotta be a way to stiffen-up those stringers without going to 2x4s. Got it! Foam-core of the  $\frac{3}{16}$ -inch variety is just the ticket. Besides, I'd like

to lay out a fuselage profile in such a manner that the rudder fin is an integral part of the fuselage former. Gonna solidify that elusive center line with foam-core so there's no way that fin can end up "out just a hair" like it was on my last project. It's a little embarrassing when the darn thing flies in wide control-line circle fashion on its own. Don't care to make up a cowl or landing gear set either. Think I'll borrow both from Sig's\* Liberty Sport. The cowl will provide plenty of room for just about any powerplant, and

hardwood beams should make engine mounting a breeze. Wheel pants really dress up a model... think I'll borrow those from the Liberty Sport as well. And I'll make a cabin structure that won't go "crunch" should fate call for a nasty landing!... My Saito\* 45 is just waiting for something lightweight to



Underside of wing center section. Threaded ball links and torque rods for flaps.





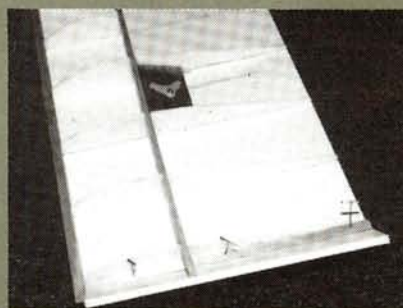
haul around. Yessir! It's definitely time to build a foam-core floater. Let's get to it.

**STAB AND ELEVATOR:** Trace out the foam-core portion of the stab with carbon paper. Include the location of the capstrips, the notched center section sheeting and hinge centers. Cut out the

stab and center notch using an extremely sharp knife along a straight edge and irregular curve. The best cutting technique is to hold the knife (I use a wallpapering-type with break-away blades) at a low angle and to

perch yourself directly over the blade to ensure that a vertical cut is made. Little sanding is usually required to square-up the foam-core edges. Transfer the

*(Continued on page 86)*



*Balsa spar provides strength, foam ribs the shape. Balsa triangle reinforces wing tip.*

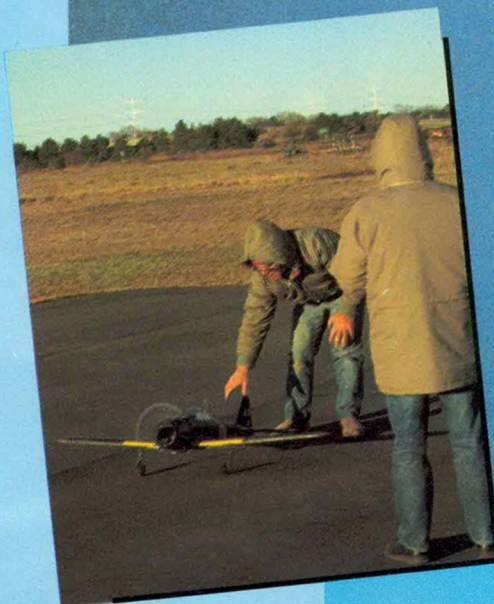
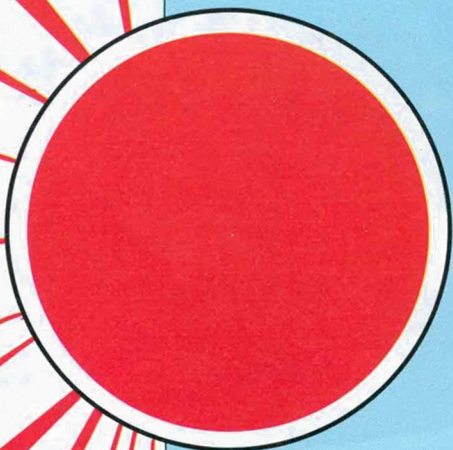


*Gusseted ply landing gear plate glues to keel and ply reinforcement.*



*Initial radio installation. Battery later moved to position under fuel tank.*





Type: Sport/scale.  
Wingspan: 59 inches.  
Wing area: 542 square inches.  
Engine required: .40-.45 2-cycle,  
.60-.90 4-cycle.  
Channels required: 4-5.

HOBBY SHACK

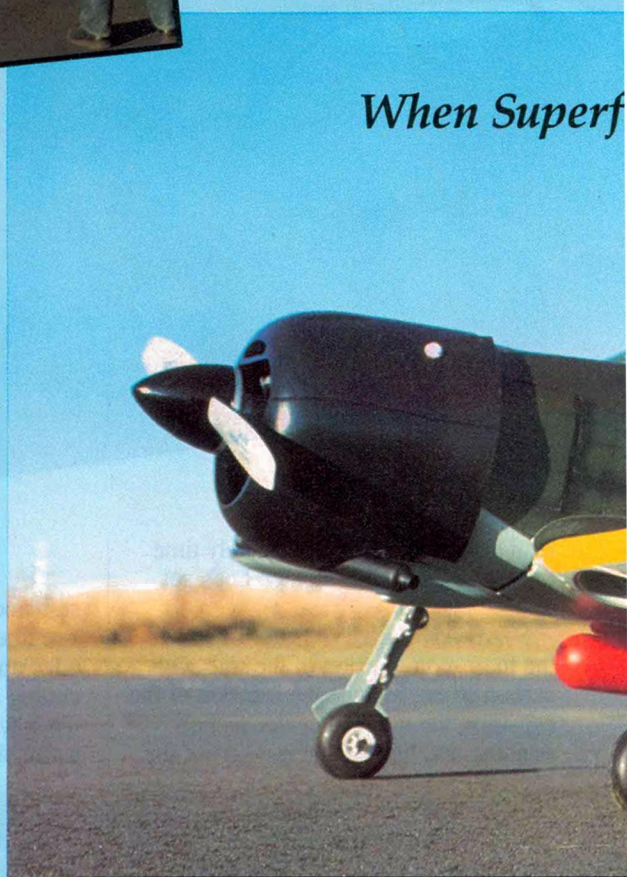
**E-Z** by CHRIS CHIANELLI

# ZERO

**H**OBBY SHACK'S\* NEW ADDITION to their Warbird series is the Mitsubishi Zero, the fighter that dominated the Pacific skies in the early stages of World War II. The Hobby Shack version most closely resembles an A6M2 of the 402nd Chutai, 341st Kokutai, Clark Field, Manila, winter of 1944.

The Zero, in terms of finish and weathering refinements, is the best EZ Warbird yet. The Mustang and FW 190 were good, but the Zero is simple; unlike the Mustang which was a bit overdone. As with the other EZ Warbird, all plastic parts must be sprayed with a matte clear or scuffed with 000 steel wool if you don't want glossy panels on your fighter. (With those the enemy would spot you at 10 miles!) I coated all the plastic parts with Black Baron flat clear as I did on the FW 190. Incidentally, the stuff has never peeled off.

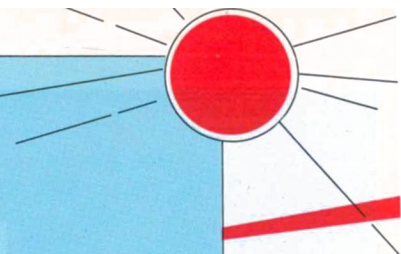
Following the design approach of all other EZ kits, the Zero's structure is a three-layer skin (foam-board sheet covered with color scheme layer



covered with Mylar) stretched over an inner skeleton of balsa and plywood.

Because these kits are carefully packaged, parts never arrive damaged. Everything is provided except the radio and engine. All parts are bagged and most are of very high quality like the spinner, wheels and tank. Notice I said "most." Unfortunately, the plastic clevises are poor, and I suggest you throw them out. Not only are they brittle, cracking easily in cold weather, but there's





## ing, Easy-Building Add Up To ZERO.



too much flash left from the molding process so that some of the clevises would not snap closed. I've noticed a decline in the quality of this particular piece of hardware in the past few EZs I've bought. Other than this, the quality of the parts has been maintained and, in some cases, improved.

**CONSTRUCTION:** Assembly can be completed in three or four evenings. One area in which the Zero has been improved is the fit of the

plastic parts such as the large, attractive wing fillets and tailcone parts that fit perfectly. This was most apparent in the tailcone, which has four main parts, giving the sharp, sleek tailcone which Zeros are known for with a minimum of work, while also hiding the tail-wheel steering mechanism.

I deviated from the instructions in the elevator Y pushrod installation, and the steel wing hold-down bolts (which I replaced with nylon items). It's so much easier to get the Y elevator pushrod



in place and through both exits *before* the stab is glued in place. The illustrated method is difficult even when using the provided snaking device. Another point I'll continue to emphasize is *don't* use the steel wing bolt. Simply knock out the pre-installed blind nuts and tap the existing hole with a 1/4-20 tap. The hole is just the right size.

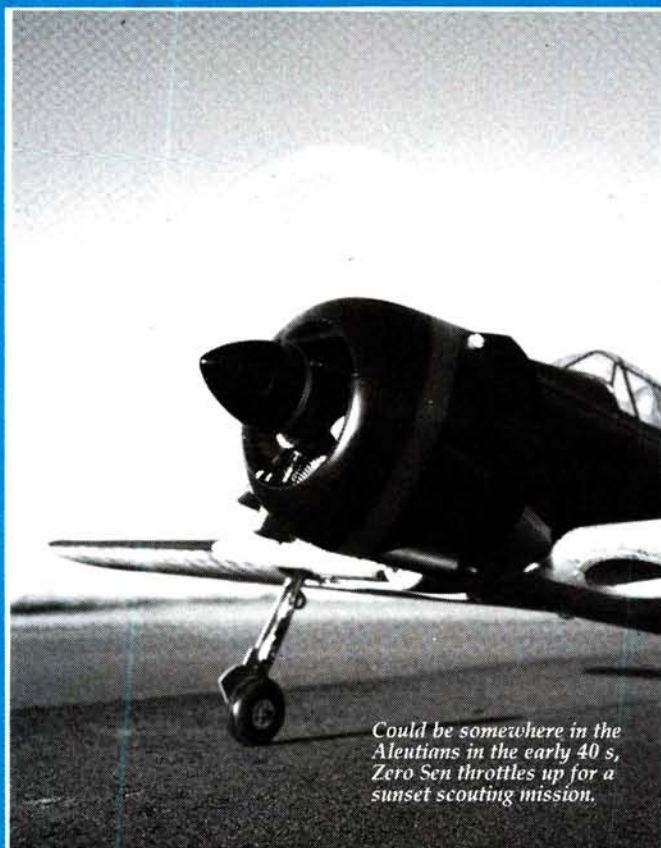
One word of caution: the wing hold-down plate is plywood, and this isn't good for long-term maintenance of threads. The solution is to thread the hole, coat the threaded hole with medium-viscosity cyanoacrylate, and re-thread. Threads cut in cyanoacrylate are strip-proof.

Apart from these two points, you can follow the instruction book, which has about 65 photos and diagrams.

The finished Zero, powered by a Saito .80, weighed 6 pounds, 6 ounces and balanced perfectly with battery and receiver placed under the forward section of the canopy. This is my second Saito .80 and both are among the most powerful 4-strokes in their class. The remarkable thing is that idle and handling characteristics are not sacrificed. My other Saito .80 is in one of my seaplanes and I rarely need to retrieve the plane because of a flame-out.

**PERFORMANCE:** On the day of the test flight the wind was extremely strong, and blowing across the runway at that! It was so cold that I decided to forego any engine break-in and fly the Zero since the Saito ran so well on the first start. However, the fantastic idle I had with my other one was a bit elusive since the engine is brand new. I've every confidence it will eventually match my broken-in example, with further running in.

Nick "Giant Scale" Zirola let the model go, cross wind, and the plane was airborne in approximately 15 feet, vaning immediately into the wind. As a result of the solid roll axis control, the model was easily controlled and the cross wind was never allowed to get under a wing. Remember to heed the recommended control throws on the ailerons and elevator.



*Could be somewhere in the Aleutians in the early 40 s, Zero Sen throttles up for a sunset scouting mission.*

I went a little extra and found that the model was sensitive in both roll and pitch; a switch to low-rate yielded a far smoother flight. I gave the transmitter to Nick and the motor went dead. With the amazing instinctive precognition of a true R/C Squirrel, Nick was later able to make a most gentle three-pointer, attesting to the slow-flight characteristics of the Zero. Next in line was our executive editor, Rich "King Ura of Jetdom" Uravitch, who proceeded to put the Zero through the usual paces of rolls, split S's and high-speed low passes. He was most impressed, not only with the airframe but also with the pulling power of the under-propped (11x7.5) Saito. When it was time for King Ura to land, the wind had died down. Since old dogs don't easily learn new

tricks or adapt to changing temperature or wind condition, he greased the Zero in, thinking he still had a head wind. The model rolled off the end of the runway! When the plane hit the grass the tail was already down so the speed wasn't that great. Nevertheless both main gears broke out of wing. This seems to be one of the weak spots of the Warbird line, as the same thing happened to my FW-190. We'd like to see the manufacturer beef things up in this area.

Other than that, we had no problems with the Zero and it can only be described as a pleasure to fly; a ship any intermediate pilot can handle. Remember, ours is a preproduction prototype so the weak gear problem may no longer be a problem. During hangar flying, after this session, we all agreed that we'd like Hobby Shack to expand their Pacific Theater series. Maybe a Hellcat, Corsair or P-40, but we'll pass on the Brewster Buffalo\*.

*\*The following is the address of Hobby Shack, the mail-order distributor featured in this article:*

*Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.*









## Field & Bench Review



ALTECH



# SOPRANO<sup>.40</sup>

THIS ARF HELPS MAKE EVERY MANEUVER A TENOR.



by REED KALISHER



I'VE ALWAYS FELT that Altech Marketing\* does a fine job of selecting and supporting an excellent product line. As usual, I was delighted when they introduced a new line of Almost Ready to Fly (ARF) aircraft. I managed to get my mitts on a low-wing sport flyer called the Soprano, and an Enya .45 Super Sport, also from Altech.

I must confess that when I first opened the box, I was a little disappointed in what I perceived to be mediocre quality. My opinion changed as I started to assemble it, and when the people at Altech assured me that they would take note of my recommendations for improvements. Now that I felt better (and finished the plane), here is what I found.

**THE KIT:** The Soprano is of balsa construction, and is completely pre-covered. The hardware is fairly complete, including an 8-ounce fuel tank and wheels. If you are going to fly off a grass field, you will probably want to replace the wheels provided with larger ones. I substituted 2.75-inch mains and a





# **SPECIFICATIONS**

**Wingspan:** 59.5 inches  
**Length:** 48 inches  
**Wing area:** 607.5 square inches  
**Engine:** 40-46 2c, 60-90 2c  
**Radio:** 4-channel  
**Weight:** 5.75 pounds



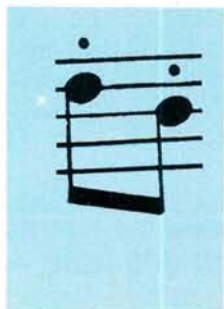
2.5-inch nosewheel, using Zinger Ultra-light wheels. If you're fortunate enough to have a paved runway to fly from, the wheels provided will do just fine. The instruction booklet is fairly concise, and here are a few hints that will aid in easier construction as you go along.

**CONSTRUCTION:** The wing is the first assembly to tackle. The ailerons are in place but not yet glued in, so remove them carefully and put aside. The wings are aligned by using two plywood spars. Dry fit them first to be sure they don't require any sanding. Mine were a little tight, so I sanded them just a bit to ease insertion pressure. They should be epoxied into place with additional epoxy applied to the rib faces. After the epoxy has cured, apply

the provided tape trim over the seam. The booklet shows only a lower strip, but you will find one for the top too. After they're applied, run a bit of CA glue along the seams to ensure they are fuelproof.

Now you can attach the ailerons to the wings. I felt a little more comfortable replacing the hinges with Du-Bro\* large pin hinges. This requires deepening of the pre-cut slots. I replaced all other hinges this way too. A simple three-piece assembly holds the servo, but be sure to place it so that it butts against the spar. This takes the stress off the wing skin. Add the landing gear, and the wing is done.

The fuselage offered the only real area of concern in the kit. After studying the covering, I wasn't that convinced it was as  
*(Continued on page 105)*





**Length:** 45¾ inches.  
**Wing span:** 59 inches.  
**Wing area:** 708 square inches.  
**Weight:** 4.4-5.7 pounds.  
**Engine:** .40-.45 2-cycle.  
.60-.90 4-cycle.  
**Radio:** 4-channel.



*1917... somewhere over Flanders,  
our intrepid birdman seeks an un-  
wary Saulnier.*



*This EIII must be a current-day  
replica! Note the modern helmet  
on the pilot who bears some  
resemblance to our Editor!*

generally useful and has adequate drawings, but some sections seemed to be describing a different bird. For example, I read: "cut bottom foam skin for servo," but there's no foam on the wing or anywhere else!

Wings are constructed by simply epoxying the

halves and bracing them together, adding the ply doubler to strengthen the wing bolt hold-down, and gluing the center cover in place. Make sure the wing halves are not twisted before the epoxy cures. The wing-tips were flimsy even after I'd installed the required stiffeners. I suggest that you add another piece of balsa near the trailing edge at the widest point of the tips, or cut new tips from a thicker sheet of balsa. If not, you'll get unwanted washout at the tips once the wing is covered.

I covered my Fokker with Black Baron Film from Coverite\*. This covering is easy to work with and gave excellent results. Just remember two things: become familiar with the instructions, and never let two pieces of the underside touch while the protective backing is off, because you'll probably ruin those pieces.

The fuselage has a factory-installed wing-mounting block as well as holes to accept the two locator dowels. The only step left is to sand the center cover slightly to match the contour of the fuselage.

Landing gear installation is simple using the four screws provided which mount to a hardwood section on the bottom of the fuselage. Add short lengths of ½-inch triangle stock where the landing gear plate is attached to the fuselage. This will add considerably to the joint strength. This is not a design flaw, but just a recommendation, as we knocked the gear and block off during an aborted touch-and-go. Do you think the fact that the "touch" was at the bottom side of a loop at about 60mph had anything to do with it?

The three wheels included in the kit (one's the tail

*(Continued on page 98)*



*The Webra 80 4-stroke offers quiet power and runs extremely smooth when positioned properly, see text.*





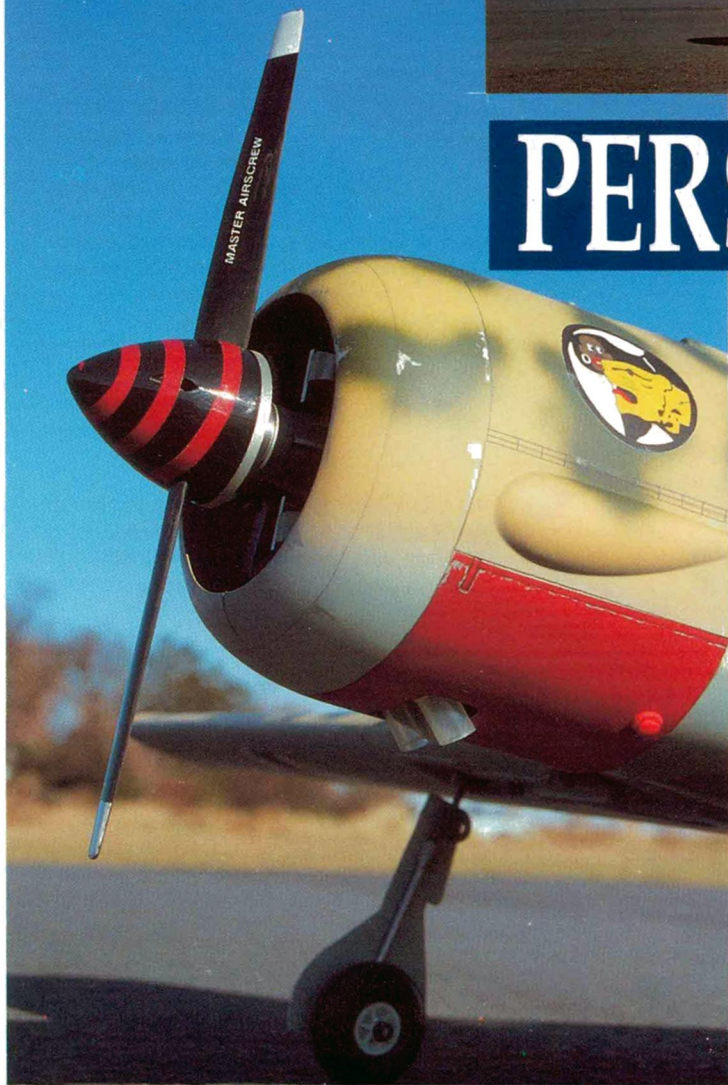
# PERSONALIZE YOUR EZ WARBIRD

by RICH URAVITCH

**I**F THERE'S ANY drawback to Hobby Shack's\* series of "EZ" Warbirds (Mustang, FW-190, and Zero) it has to be the fact that each looks exactly like the next one—not a particularly astute observation on my part considering that they're production kits!

When I reviewed the Mustang in the February 1987 issue of *MAN*, I commented that it would be great if undecorated kits were available, so enabling the builder to apply the finish and markings of his choice. *His* EZ Warbird wouldn't *have* to look like all the others on the flight line.

Well, that same Mustang provided the incentive for this article—also the test pieces! Yup, I was showing off one day, ran out of fuel at low level, couldn't make it back to the runway, had nowhere to go,





# CREATING A NEW "IDENTITY"... WITH AN AIRBRUSH AND SOME PAINT.

so hit the rough terrain, cartwheeled—you know the story...replacement wing on order! The broken wing provided the opportunity to experiment with some finishing techniques. Since my Mustang is still flying (with a new wing!) and I didn't want to lay it up long enough to prepare this article, I chose to use an EZ FW-190. I was pleased to find that it flies almost exactly like the P-51 so the choice was easy.

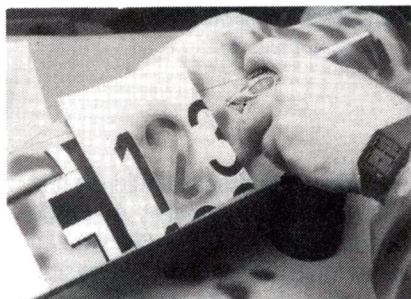
Assembly was carried out "by the book." All the control linkages were installed, the cowl was trimmed to fit the engine/muffler and all of the sub-assembly work completed. I then prepared a reworked Williams Brothers\* pilot figure, making him as sinister-looking as possible, square goggles and all. I put him in the cockpit

to slightly increase the pressure and allow the paint to flow more evenly. *Don't* use anything hotter than tap water and certainly *don't* use boiling water unless you plan a random camouflage scheme for your kitchen—or worse! The PC-40 Dark Green blotches were airbrushed in an irregular pattern. The markings were also applied with the airbrush, this time using stencils. The squadron insignia on the cowl was hand-painted. After all the color was applied, it was time to add the panel lines, as many as you have patience for. Don't forget the source documentation! The panel lines can be applied with a Rapid-O-Graph drafting pen and drawing ink or any of the fine-line, permanent markers available in stationery supply stores. I've used

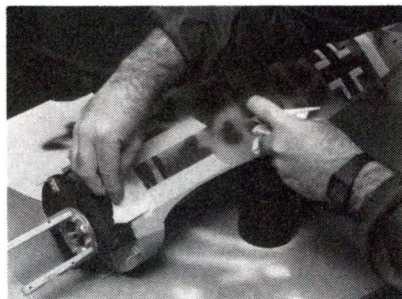
chips, streaks, exhaust staining and oil leaks completes the illusion, and you're ready to dust on a couple of light coats of Chevron's satin finish clear top coat. This will protect the new image you've created for your Warbird.

This whole procedure really doesn't take that long and the big advantage is that it gives you the opportunity to practice all your scale finishing techniques on an airplane that you know flies well without having to do the actual building. Sure, you'll never be competitive in a sport scale contest with your customized Warbird (unless maybe it's an all-ARF contest) but you sure can be flying the pants off it while you're building the "killer"!

I'm sure you'll find, as I have, that Chevron paints work very well in this



Red numeral "2" being airbrushed through a paper stencil.



Exhaust residue is simulated by airbrushing light grey paint in the area of exhaust gills.



Final touches to squadron insignia were done by hand with a fine brush.

and permanently attached the transparent canopy. After masking the clear portions, I was ready to begin painting.

Having worked with the Chevron\* line of scale military colors in the past, they got the nod for this exercise. The EZ Warbirds have a built-in, semi-matte finish which has sufficient "tooth" for the paint to adhere. After wiping down all the surfaces with denatured alcohol and lightly scuffing the plastic parts (cowl, empennage fairing, gear doors and cockpit base) I sprayed the lower surfaces with PC-35, Azure Blue, and the upper surfaces with PC-31, Sand Yellow, applied straight from the spray can.

I preheated the cans in hot tap water

"Sharpies" with repeated success.

A touch of weathering in the form of



The Chevron paints used are available in spray or brush-on and are accurately color matched.

application. I suspect that others may work well also—just haven't had the opportunity to test them. If you have, how about letting the rest of us know? As a matter of fact, how about sending in some pictures so that we can see what your results were?

In the future, we'll push our luck and try a similar approach to the "glossy" finished ARFs.

\*The following are the addresses of the manufacturers mentioned in this article:

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

Williams Bros., 181 Pawnee St., San Marcos, CA 92069.

Chevron Hobby Products, P.O. Box 2480, Sandusky, OH 44870. ■





# Giant Steps

by DICK PHILLIPS



*Let your eyes wander over this view. There are several details which duplicate in miniature the same areas of the original airplane.*

**W**E TALKED LAST MONTH about trimming your airplane, and discussed some methods of adjusting a model which doesn't fly well. Here are a few more tips which may help to make that "doggy" airplane fly better.

If the model is a tail dragger and doesn't handle well on the ground, or its take-off runs are a series of uncontrolled swerves so that it takes off in unpredictable directions, you probably need some adjustment to the landing gear geometry.

Not surprisingly, landing gear needs adjustment just as the front end of your car does for dependable operation. For example, setting the main landing gear wheels with some toe-in will help to make the model easier to handle on the ground. The same thing applies to adjusting the main gear so that there's some camber to the wheels. That is, the wheels are closer together at the bottom than they are at the top. These two simple adjustments can make a very significant difference to the way your model handles



*Hard to tell whether this is the model or the full scale machine. Note the leather cuffs on the strut ends.*

on the ground. How much adjustment is necessary will depend on the model and the size of wheels you're using, but the changes made will be quite apparent to

the eye. The alterations should be the same on both sides, of course. As a side benefit you'll find that the model with an obvious amount of toe-in will tend to stop more quickly than the model whose wheels are perfectly parallel. The friction caused by the wheels being other than dead true will slow the model down a little faster on landing.

Changing a wing after it has been covered isn't an easy task. First check that the wing is true, assuring that the wing is not twisted out of shape. If it is twisted, and that twist is more obvious on one side than the other, then this needs to be corrected. If the wing is covered and painted, you can try treating the wing with steam from a boiling kettle while twisting it in a direction which will eliminate the curve. You'll find that you need to twist the wing more than seems necessary, as it will spring back toward its original shape once you stop twisting. With care and repeated attempts some severe warps can be successfully removed.

A help to stability can be built in during construction. This can be accomplished





*An exact replica in infinite detail of the Luftwaffe trainer of the 1930s, Nelitz goes to great lengths to assure the exact details of his models.*

by building some washout into the wing. Washout consists of a deliberate twist in a wing, raising the trailing edge slightly. Needless to say, any washout must be the same in both halves of the wing! While construction is underway, the trailing edge of the wing may be shimmed upward, and this will provide a few degrees of washout.

How this works to increase stability is quite simple. As the wing is put into a stall situation (i.e. higher and higher angle of attack accompanied by a decrease in speed) the tip section of the wing which contains the washout remains at a lower angle of attack than the inboard section of the wing. This prevents the tip section from stalling when the inboard section stalls. This stall then causes the nose to drop and the airplane to pick up speed, so flying out of the stall. The fact that the wing tip does not stall (or does not get as far into the stall as the inboard section) prevents the airplane falling off on one wing as the tips are still flying outside the stall. This makes for a much more stable airplane.

Again, with some care washout can be set into completed wings using the same "steam and twist" method used to eliminate warps. Care must be taken to ensure that the washout is the same in both wing tips. While this is not one of the best ways to proceed, it's possible, if you're careful, to provide some washout to a model which has shown a nasty tendency to fall

off abruptly on one wing when entering a stall.

Last month I mentioned center of gravity (CG) and balancing a model. We traditionally add weight to a model to get the CG in the position specified on the plan. The weight required can vary widely depending on where it has to be added. If we see the distance between the tail and the CG as one moment arm and the distance between the CG and the nose as another, it will be obvious that these are usually of significantly different lengths. It should be equally obvious that the weight required to be added to the shorter

Our larger batteries represent a significant weight, and they can be relocated to cut down on the balance weight required. This is something which must be done carefully so as not to compromise the circuit to the receiver. It's important to use wire of sufficient circular mil area (diameter) here. Placing the battery further from the CG can significantly reduce the amount of balance weight required.

Careful selection of accessories can also reduce the amount of weight needed. A lighter set of wheels, a lighter tail wheel assembly and lighter or heavier spinner



*World class Canadian Scale Modeler Bob Nelitz and his most recent effort. This Bucker Jungmann is another example of Bob's excellent and painstaking workmanship.*

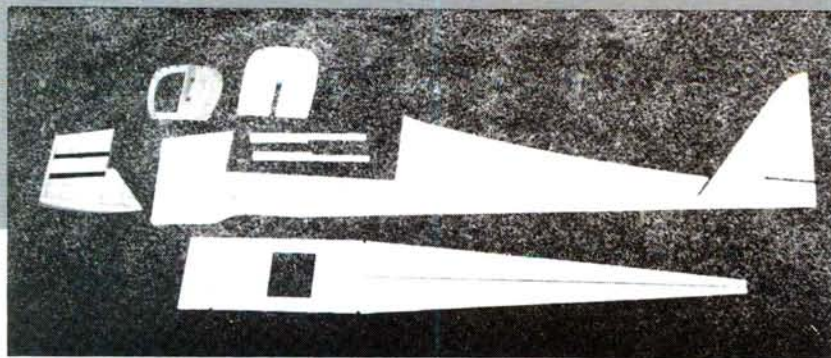
moment arm is greater than the weight required on the longer moment arm to overcome the same weight imbalance.

Before starting to add extra balancing weight to a model, it's a good idea to make sure that items within the model are placed in the best locations to minimize the amount of balancing weight required. Most of the engines we use on our larger models have fuel pumps, so we have a lot more freedom as to where we locate the fuel tank. Because fuel is burned off during a flight, the tank should be located as near the CG as possible in order to eliminate any shift in balance as the flight progresses. (Continued on page 116)



*Dan Parsons, Albuquerque, NM, with his modified Ace kit. Dan calls it the PARMACE and says it flies well and is very stable. Span 81 inches, weighs 14.5 pounds and is powered with an ST 2500.*





Basic fuselage components from foam core and ply. Nose doublers (far left) have guide lines drawn for bulkheads and engine bearers.

## FC FLOATER

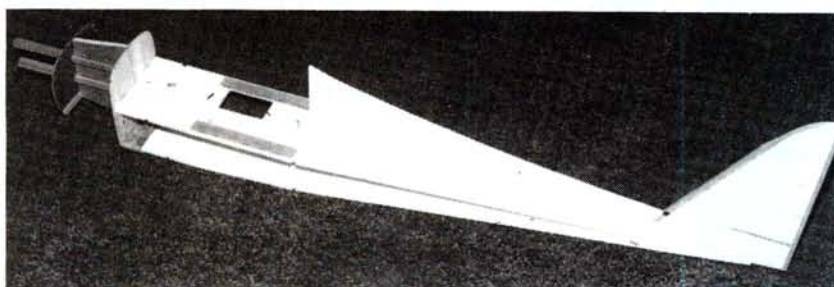
(Continued from page 61)

capstrip and sheet locations to the underside with a tri-square along the trailing edge.

With the foam-core pinned to a flat surface, add the capstrips and center sheet balsa using your favorite thin cyanoacrylate. It's best to poke some pin-holes through the center sheet material before gluing. Thus, small drops of Zap (my favorite) may be added through the holes to meet the paper surface of the foam-core and not the foam itself. Incidentally, the balsa parts that add scale appeal may be cut slightly longer, glued to the top and bottom surfaces, and sanded flush with the foam-core edges. No more short capstrips!

Glue the leading and trailing balsa edges with carpenter's glue over the foam edges or with Pacer Tech's\* Z-Foam Primer and Zap-A-Gap if you're short of building time. Note on the plans that the leading edge pieces are cut, glued and sanded tangent to the rounded tips before laminating three strips of soft  $\frac{1}{16} \times \frac{5}{16}$ -inch balsa to complete the rounded ends.

Allow the stab assembly to cure overnight before rounding the leading



Horizontal FC keel slots on to vertical member. Shape, strength and alignment assured.

edge and rounded tips. Slot the trailing edge for the hinges and cover it with a 1-inch strip of covering material once the stab is sanded smooth. I usually pin the hinges with round toothpicks adjacent to the balsa trailing edge and clip the toothpicks flush with the foam-core surfaces. No sanding is usually required, unlike conventional balsa construction.

The elevator assembly is of

conventional sheet balsa and hardwood construction, so I'll say no more on those items and save more space for foam-core oddities instead.

WING: Flat-bottomed foam-core wing construction starts out much like the stab. Each half-wing, minus the leading and trailing edges, is laid out on the foam-core surface with a square and tape measure. That also explains

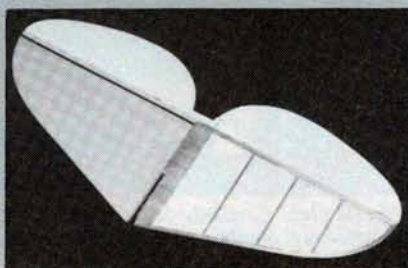
(Continued on page 86)

**Order the full-size plan!**

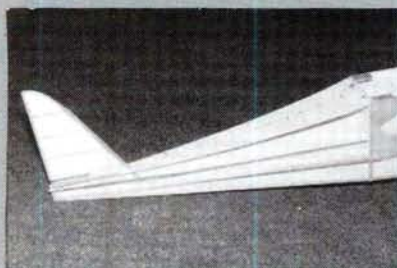


#288 **FC FLOATER** \$16.00

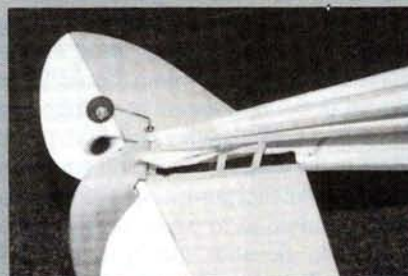
The FC Floater ("FC" standing for foam-core) is a .45-cycle-sized cabin wing trainer. With a structure of inner balsa and outer foam board, this 78-inch-span model has ultralight wing loading and can be built more cheaply than all balsa structures.



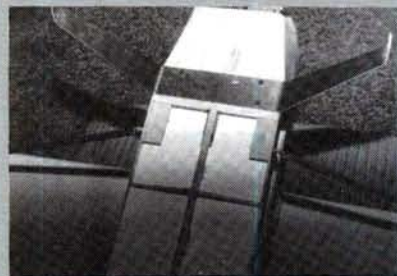
Foam core and balsa tail assembly partially covered.



Top foam core former is scored on underside to facilitate curving. Balsa triangle supports stabilizer.



Tailwheel wire fitted into slot, reinforced with nylon tape. Darkened area is triangle stock reinforcement.



Streamlined tubing, Robert hinge points make simple "pop-off" strut installation.







## KITPLANES

(Continued from page 25)

130-140mph and 800 feet per minute up. The Glasair was racing through 165mph and 1300fpm up!

Later, out over Lake Winnebago, I quickly found the airplane didn't know upside down from right side up, and in either position it was as happy as a clam to give me over 260mph true airspeed. I know I've never spent that amount of time upside down in excess of 200mph in

anything that wasn't ex-military. So smooth, so fast, so easily tamed... it was truly unbelievable. And it came in a big shiny box!

But, while the Glasair may be the fastest, it's by no means the *only* man-carrying ARF out there. In fact, there are almost a dozen kitplanes that would be duck soup (have you ever wondered why something easy is always "duck soup?") for the average R/C builder. But if the R/Cer doesn't want to go 1:1, these airplanes still make some of the finest

modeling subjects available because they lend themselves so nicely to little foam fantasies.

**LANCAIR:** The Lancair 235 or the new 150hp 320 is not only one of the most popular kitplanes, it's also one that would model well because of its high aspect ratio wings and wide-stance retracts. Also, since it's one of the few designs using high-temperature foam, it's one of the few that can be painted anything but highly reflective white for ultraviolet protection, which makes for more interesting, but still authentic, models.

**SILHOUETTE:** The long, slender Silhouette is as much a powered glider as anything else. Even so, it can touch 120mph. Build it light at 1/4-scale and it would probably stay aloft forever on thermals.

**VELOCITY:** A four-place, Canard design borrowing heavily on Rutan's LongEZ design, the Velocity shows what can be done with the Canard configuration when varying loads will be carried. This pumpkin seed-shaped fuselage would give lots of room to hide radios and today's lunch.

**WHITE LIGHTNING:** A totally different approach to a four-place design, Nick Jones' White Lightning will stay up with the Glasair III but with more people on board. It's a runner!

**VENTURE:** The Quest Air Venture is unusual in a lot of ways. It's metal, which makes it rare, the gear looks like an F-16 fugitive, and the airplane looks... ah, it looks... well, you know... sort of pudgy! Actually, it isn't short at all, it's just wide for its length (and I'm just short for my weight!). Like all the others, it's designed to run in the mid-200mph ranges.

**SX300:** The all-metal SX300 is your basic homebuilt fighter. Designed by the well-known designer, Ed Swearingen, it's meant to give the homebuilder his own 275mph rocket. But those little wings mean approach speeds in keeping with its fighter image.

**WHEELER EXPRESS:** The prototype of the Express was first shown to the public at Oshkosh '87 and got an immediate reaction. Totally conventional in its configuration, its smooth lines were anything but conventional. A full four-place, folks seemed to like it.

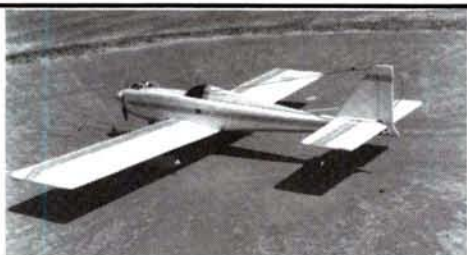
This is only a small sampling of the 1:1 ARFs out there and each would make a delightful machine in any scale. The important factor is that the ARF principle knows no bounds and appears to be a progressive movement that will eventually suck in many modelers and let them see what it's like looking out from the inside.

### M.V. SPORT

Wing Span ... 55 in.  
Wing Area ... 550 sq. in.  
Weight ..... 41/2 to 5 lbs.  
KC System ... 4 ch.  
Engine ..... .40 GLO

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# Confessions of an **ARF FREAK**

by **CHRIS CHIANELLI**



**M**Y SANITY IS TENUOUS, and yet somehow firmly rooted in my basement. In past years a Friday night trip downstairs was fraught with tension as I searched for a model in airworthy shape for Saturday flying. Now the basement is crammed with planes; red ones, blue ones, olive drab—you name it!

Now on Friday nights I ponder: "What kind of a week has it been, Chris?" If preceeding days have been pleasant, and a sweet, elderly lady has told me what a wonderful young man I am, then I'll probably want to commune with nature, be "one" with the elements, and I'll opt for a graceful 1/3-scale Christen Eagle or maybe my 1/5-scale Chipmunk would be just right.

On the other hand, after a bad week at Air Age Publishing, and a long Friday night trip home soured by too many close encounters of the rude kind, I'll definitely need my FW190. Charged up and equipped with a Hobby Lobby\* dropping bomb, I vent my frustrations by re-enacting Blitz-Kreig on the local ant hills. What low-cost therapy!

And what about the products developed during my 18 years of R/Cing which leave us all saying: "How did we get along without these things?" Cyanoacrylates, House of Balsa\* Tuf-Grind, and servo-reversing. We're spoiled! These are just three of the countless improvements

which have made my years of R/Cing so personally satisfying.

And now... ARFs! Nothing before this has had such an impact on the R/C world.

Only a few years ago the thought of ready-to-go Lazars, Decathalons and various Warbirds was nothing more than a modeler's daydream. Today it's reality. Today that good ol' "fly it every Sunday" standby is no longer a shoebox that's sprouted wings. Instead, it's a shiny Pitts or Diabolo—not bad to tool around in while work on a long-term balsa scale project progresses.

With all these positive goings-on, I'm still astounded when I'm occasionally confronted by a modeler who's distressed by the ARF "happening." Frequently, their logic is: "With these ready-to-go jobs, well, just anyone can go out and fly. Their clubs should make them build a balsa kit before they're allowed to fly."

The thinking behind this is that if you can *build* you can of course fly better and are more able to understand the need for safety rules. Obviously, the one has *nothing* to do with the other. If it did, we might be required to build our automobiles before we're issued a license to drive. I think that these individuals resent the expansion of the hobby to include a broader range of people. It seems that they prefer to covet the hobby as theirs alone by shrouding it in a cloak of mystery, retaining their own positions

*(Continued on page 94)*



## FC FLOATER

(Continued from page 78)

why only one wing half appears on the plans. Before cutting each wing half to length, be sure to leave the outboard end extra long so it can be scored on the underside and tilted up to form the wing tip.

In the bottom layout include the servo well, pushrod exits, center sheet and capstrips. The top surface layout should include the location of the  $\frac{3}{16}$ -inch main spar, ribs, strut block and bellcrank access

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hole. Refer to the plans for the true location of all details. The building technique, however, remains the same.

Assembly begins with the addition of  $\frac{1}{16}$  x  $\frac{1}{8}$ -inch balsa capstrips as shown. Omit the capstrip at the outboard end (next to the score line) until the wing-tip is sheeted later. The center sheeting is best left off until the wing halves are joined. With the wing panel pinned flat (use  $\frac{1}{16}$ -inch shims under the center section) glue a straight, medium-to-hard balsa main spar which has its outboard end mitered at 45 degrees and the inboard end cut to the required dihedral angle. Be sure the spar is pinned at right angles to the foam-core former.

While this assembly is drying, prepare the foam rib halves. Cut grocery store foam meat trays (usually  $\frac{1}{8}$ -inch) for the ribs using a sharp knife along a stiff pattern made of illustration board (available from art or drafting suppliers). Little or no sanding is required if a sharp blade follows the pattern carefully. Holes for the bellcrank wire may be made with a scratch awl. Glue the rib halves at right angles to the foam-core former and spar. Don't glue the leading edge (this is tacked temporarily) but tip-up and glue the foam-core wing tip to the mitered end of the spar, and reinforce the score lines section with a  $\frac{1}{4}$ -inch triangle as shown. Sheet the wing tip with  $\frac{3}{32}$ -inch balsa and cut its final shape by running a hacksaw or razor saw blade, partially covered with paper, over the last few outboard ribs. Glue the  $\frac{1}{8}$ -inch triangular-shaped balsa supports to the foam ribs prior to fitting the  $\frac{1}{8}$ -inch plywood aileron bellcrank plates.

Incidentally, with this type of wing construction, a flexible brand of nyrods could easily be substituted for the aileron controls if you wish.

To the inboard end, glue the  $\frac{1}{8}$ -inch balsa partial rib that lines the servo well (flush with the bottom of the foam-core) to the foam-core edge and spar. Glue the two  $\frac{1}{8}$ -inch-ply dihedral braces and the  $\frac{1}{8}$ -inch-balsa half rib to the left wing. Carve and sand the assembly to the airfoil shape prescribed by the ribs. Note that both the capstrips and sheet materials should be left about  $\frac{1}{2}$  inch extra long at the front to facilitate bending and pinning to the workboard. Once the assembly has dried, trim the balsa flush with the foam ribs and carefully true-up the leading and trailing edges with a long sanding block.

Once the right wing is built, without dihedral braces, test-fit and epoxy the wing halves together, ensuring the foam-core bottoms line up and the dihedral

braces rest on the foam-core. Glue the  $\frac{1}{8}$ -inch-ply dihedral brace at the rear edge of the servo well (flush with the foam-core bottom surface) and add the  $\frac{1}{4}$ -inch partial balsa rib aft of the servo well.

Also glue a  $\frac{1}{8}$  x  $\frac{1}{4}$ -inch balsa strip that has been curved to the rib shape over the center of the servo well so that the top sheet material will butt onto its top.

Flap operation is best accomplished with aileron wires capped with ball links. Incidentally, this bird flies well without flaps. You may glue them solid if you're limited to a 4-channel radio. I used a soft balsa block to house the Robart\* snap-apart hinge-point strut fastener. The underside of the wing will require  $\frac{1}{16}$ -inch strip material to surround the hinge-point hole. Refer to the plans for details.

The trailing edge and aileron/flap material is standard balsa sheet so I'll say no more on that subject.

I'd like to add that I glassed the wing center section with 6-ounce cloth as shown on the plans. You may view that as overkill since the wing center section has ply dihedral braces. However, I did find that the wings didn't fold up when one strut came loose. At that point I removed the other strut to further test the wing. Docile flight maneuvers showed that the wing was rugged.

With the struts back on, the wing stood up well to loops and spins as well. If you wish to be real nifty, try a Telemaster wing for a clipped-wing version. It should fit with little modification. In the meantime, sand and set the floater wing aside until called for later.

**FUSELAGE:** Using carbon paper, trace the outline of each part including the center lines. Include on the vertical foam-core former the location of the  $\frac{1}{8}$ -inch-ply nose doublers (mahogany doorskin works well) the horizontal foam-core former, the rudder fin capstrips, stabilizer and rudder (leading edge) slots. Reinforce the slots with a slab of scrap balsa. Note that the vertical former is cut extra-large at the nose, with the exception of the dash and cabin floor lines. The same goes for the 2-ply doublers. The final nose shape is bandsawed once the ply doublers are aligned and glued. I used the rubber cement normally used to glue paper products to form a 3-ply sandwich. Before gluing these doublers, trace out the location of the hardwood engine bearers on the left side only, the dash former (F-2) and landing gear brace on each doubler. A  $\frac{1}{8}$  x  $\frac{1}{2}$ -inch balsa joiner is glued  $\frac{1}{16}$  inch below the bottom of F-1 once the holes for the engine bearers are chiselled out.



The engine bearers are notched in order to bring one hardwood edge to the fuselage center line. The alternative is to laminate two pieces per engine bearer if a bandsaw is not readily available. The horizontal foam-core former should include the layout of its center line, servo well and rails, and the notches and slot.

Glue F-2 flush at the bottom and at right angles to the nose doublers. Epoxy the engine bearers and F-1 simultaneously, ensuring the center line of F-1 lies parallel with the nose doublers. Note also that F-1 is glued flush at the top, thus leaving balsa stock (F-1A) bevelled for the bottom nose block that follows later. Epoxy the 1/4-inch-ply landing gear plate and the two 1/8-inch-ply triangles once the blind nuts have been positioned for the Liberty Sport main gear.

Now for the tail end. To each side of the rudder fin glue in place the balsa capstrips. Again, these may be cut slightly longer as was recommended for the stab. The leading edge stock fits into a slot to prevent the rudder fin from folding over in paper-carton fashion should the aircraft topple over. When gluing the leading edge be sure to work on a flat surface and shim the fuselage former with 1/16-inch scrap balsa to ensure a perfect vertical

rudder fin. Once dry, the leading edge balsa is cut tangent to the curve at the top and balsa laminations are glued as was done for the stab tips. Don't cut the balsa trailing edge at the stab slot until the stab is fitted later.

So far the fuselage structure appears flimsy. Ha! Now add the foam-core longerons to the vertical former and see what happens! You now have part of what resembles an I-beam section. I use a hot-glue gun at such intersections. A small "weld" is run along each side of the longeron butt joints. The two longerons (be sure to make a left and right) must be scored on their undersides at the cabin area to produce a neat bend before gluing. The horizontal former is further prepared by gluing 1/8-inch-ply servo rails 3/16 inch in from the foam-core edges and level with the rear notches.

Prepare the foam-core cabin doublers by gluing extra-long (see plans) 1/4 x 5/16-inch balsa strips to their front and rear edges, flush with the inside surfaces. To the left and right doublers, epoxy the hardwood wing blocks at an angle corresponding to that of the rear cabin former (F-3) so that the outer surfaces of the blocks may be sanded flush. Don't be

(Continued on page 88)

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## FC FLOATER

concerned about marring the paper surface of the cabin doublers as these will be sheeted later. The balsa sheet that forms the window outlines also carries the load imparted by the wings. Therefore, the foam-core doublers serve only to stiffen the cabin area.

The window outlines were traced during the layout stages. The window portions may be spray-painted, inked with markers as I chose to do, or simply left white.

Cap the top edge of F-3 with balsa. I avoid raw foam edges like the plague!

While the rear portion is drying, continue the nose. Sand the bottom of the fuselage assembly and the  $\frac{3}{8}$ -inch soft balsa bottom block at an angle to meet the ply landing-gear plate. Epoxy the bottom block, add stringers, and sand the nose section. Dampen the outside surface of  $\frac{3}{32}$ -inch balsa sheeting and glue to the left side only. Incidentally, there seems to be enough room for a smoker tank on the left side if you want one. I now regret not having included one.

Note that the sheeting should begin at the top center line so that it can easily be trimmed below the bottom block. Trim and sand the sheeting flush with F-1 and F-2 before gluing the foam-core cabin former flush with the edge of the horizontal former. Glue  $\frac{3}{16}$ -inch balsa on top of the cabin floor to fill in the space between F-2 and the front window post. Strength where you need it most. Balsa meets balsa and hardwood.

The bottom longeron is capped with  $\frac{1}{8}$  x  $\frac{9}{16}$ -inch balsa up to the score line. Glue these flush with the top of the longeron. All other capstrips are  $\frac{1}{8}$  x  $\frac{1}{4}$ -inch. For clarity these are omitted on the plans. Epoxy the  $\frac{1}{8}$ -inch-ply engine bearer reinforcers. Glue  $\frac{1}{2}$ -inch triangular stock to each side of the ply reinforcers where they meet the firewall.

The right foam-core cabin doubler is best left off until the radio installation is complete. The battery pack was eventually moved *under* the fuel tank to achieve a respectable CG. The center servo rail is basswood stock that's been notched so it overlaps the cabin floor by  $\frac{1}{2}$  inch at each end.

The holes for the elevator and rudder nyrods may be punctured with a scratch awl once the servos are installed. The right-side nose sheeting and entire fuel compartment should be fuel-proofed before gluing. Add the right-side cabin former and  $\frac{3}{16}$ -inch balsa filler as was done for the left.

Glue the  $\frac{1}{8}$ -inch balsa cabin sides and

window post. I used rubber cement on all but the hardwood-balsa junction. Epoxy is recommended at the wing blocks. Note that the bottom  $\frac{9}{16}$ -inch capstrip is to be trimmed so it tapers from the  $\frac{1}{4}$ -inch-wide capstrip at the score line and finishes  $\frac{1}{8}$ -inch below the landing gear ply. I felt like doodling one night so I added Jon Doe Pilot with a black felt-tip marker to the left side and Jane Doe Passenger to the right. Sure makes a lightweight flight crew. Cheap too!

Balsa is added to the rear portion so that any type of covering material may be selected. Cap the horizontal former with  $\frac{1}{8}$  x  $\frac{1}{4}$ -inch soft balsa so it's flush with the bottom. Cap the bottom longeron flush with the top surface and run to the rear post. To the bottom surface of the fuse, glue the  $\frac{1}{8}$ -inch ply tailgear mount directly over the foam-core.

The top of the fuselage rear is formed by a foam-core slab that's scored on its underside to produce the required bends. Add two pieces of  $\frac{1}{2}$ -inch balsa triangle beneath the stabilizer slot. Plane the triangle stock so that it runs out at the rear and cap the foam-core edges with  $\frac{1}{8}$  x  $\frac{1}{4}$ -inch balsa, flush with the bottom of the foam-core. Some trimming will be required at the stab rest. Scrap balsa blends in the rear post.

With the wing position noted, shape and glue the  $\frac{1}{8}$  x  $\frac{5}{16}$ -inch balsa stringer to the foam-core and rudder. Bevel the bottom of  $\frac{1}{4}$ -inch balsa, glue in position and plane so it runs out at the cabin side. The balsa piece on the far side has yet to be planed. At the tail end add  $\frac{1}{8}$ -inch stringer doublers to carry the rudder fairing block, fit  $\frac{3}{8}$ -inch square balsa just ahead of the stab, and sand flush with the stringer doublers and top capstrips. The rudder fairing is best added after the top of the fuse is covered.

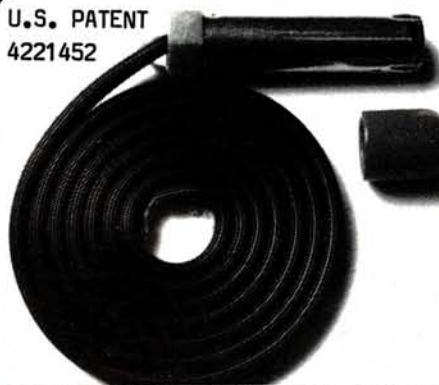
While the above assembly dries you could continue with the front end. Tie the cabin together with  $\frac{1}{4}$ -inch balsa between the window posts. Epoxy the four cowl mounting blocks as shown in the drawing of F-1 and sand the nose section to suit the Liberty Sport cowl. To locate the holes to be drilled for the cowl screws I find it easiest, since the plastic is somewhat translucent, to place the engine in its approximate position (with its muffler removed) slip the cowl over the nose section so it overlaps about  $\frac{1}{8}$  inch and adjust the final engine position accordingly. If you plan to use a spinner, be sure to make allowance for its backplate.

I'd like to point out that the original Floater was equipped with a 800mAh battery pack so some additional nose

(Continued on page 90)



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## FC FLOATER

(Continued from page 88)

weight might be called for if your battery pack is lighter. Position the wing over scrap pieces of wing saddle tape and waxed paper under the leading edge in preparation for the cabin fairing. Glue the hard balsa F-4 and drill, tap and secure the four wing bolts. With the waxed paper against the rear of F-4, fit another 1/8-inch balsa former (F-4A) against the wing so its top finishes 1/16-inch below F-4. One-sixteenth ply with its grain running along the center line of the fuse, is then glued to F-4A and the wing to form the triangular cabin fairing. A small fillet of spackling compound should blend in the fairing nicely.

With the wing still in place, flip the airframe over so you can glue the 1/4x3/4-inch balsa strut blocks. Drill 1/8-inch holes for the Robart\* hinge points and fit the struts as follows. Cut each strut 17 1/4 inches long from 3/8-inch K&S streamlined aluminum tubing. Snap the hinges apart, position the male ends within the wing and fuse holes, and the female ends at each end of the tubing. The struts can then be easily positioned and adjustment

made accordingly. When gluing the hinge points in the tubing, slip some scrap soft balsa alongside the hinge. Don't glue the male ends into the fuse holes until covering is complete. When gluing, be sure the hinges mate properly until the epoxy dries. To remove the struts just twist them slightly and they'll pop apart. The chore of mounting struts becomes a snap.

Remove the wing to fit the windows.

Final assembly includes the addition of scrap balsa braces to support the nyrods before sanding and covering. The nyrod rear portion is also glued to the foam-core vertical former so that the pushrods follow a friction-free path to the control horns.

You may find that the fuse will twist fairly easily at the rear. This was to my advantage. Just as in wing construction, the fuselage, once covered, can be given a shot with a heat gun to correct unwanted twists. If the stab is found to be misaligned with the wing when sighted from the rear, simply heat the rear portion to correct. I suppose I could have added more balsa braces but I chose to keep the weight down. The finished prototype tipped the scales at 7 pounds, 4 ounces when loaded with the Saito 45, five standard servos,

800mAh pack and MonoKote covering.

**COVERING AND FINISHING:** The prototype was covered with Super MonoKote in cream, orange and white on the control surfaces, while automotive trim tapes added the final dressing. The brown and gold tape is conveniently paired up on the roll and simply requires that you peel off the cellophane spacer once the application is complete.

The trim tapes cover the junction of cream and orange nicely. Matching epoxy aerosol enamels were used for the cowl and wheel pants.

**FLYING:** Ever notice, 'round about dusk and you're packing up, which R/Cer is also packing the biggest grin? Most of us would have to agree that those happy souls are the newcomers to the hobby—especially the ones who can look forward to the next day's outing because, believe it or not, their airplanes are still in one piece! Well, maybe two. At least they're flyable.

Here we have another flyable airplane. The comment I most often hear at the field is: "Man... look at that thing float!"—and float it does, especially if you're faced with the annoyance of a dead-stick landing.

(Continued on page 94)

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## FC FLOATER

(Continued from page 90)

Anticipate a rather lengthy approach. You'll need it! Once trimmed out this aircraft will take off darn near on its own, requiring little rudder correction and just a tad on elevator to change its attitude before it's aloft.

Turning maneuvers are smoothed out with considerable rudder input. Inside loops, rolls, Cuban eights, knife-edges and spins are a sheer delight. Only inverted flight is tricky and this isn't unusual for flat-bottom wings. Point the nose at the heavens as far as its powerplant will take it and you'll probably find the left wing drops (at least mine did) as it stalls. Not to worry, though. Let go of the sticks immediately. The aircraft will then recover on its own and you're back to hands-off flight at a one-third to -half throttle if you so wish. If you drop the flaps be prepared to feed-in down elevator as the Floater will balloon upwards. Most landings won't require flaps. Ivan Kristensen witnessed a flight or two and described its landing capability as "beautiful." If one of the world's best R/C pilots was impressed, I'm sure you will be too.

After numerous test flights and a minor adjustment of a slightly warped wing (caused by being left in a hot car I suspect) I discovered the following flight characteristics: take the Floater up and in a slight breeze the darn thing will remain airborne at idle, right along with the soaring crowd. What a hoot! It can hover on the spot, dance around in kite fashion, and turn on a dime. Drop the flaps and this airplane will go into a series of gentle stalls as it attempts to balloon. Not to worry, the stalls are straight ahead and a little down-trim on elevator will quickly correct its flight. The Floater's appearance and flight envelope most resembles that of an ultralight.

With a little more experience, inverted flight can be achieved with the flaps deployed to their limit (30). Since I haven't spent too much time flying it yet, I really can't comment further on its capabilities. I do know that it's survived some abuse and awaits another sunny day. That in itself says a lot.

The only modification I'd recommend is the addition of 1/4-inch-square balsa uprights below the center window posts. Hard landings would then inflict less damage to the lower foam-core longerons. I wouldn't add vertical uprights to the rear section without adding a heavy hub at the business end.

I'm sure you'll be thoroughly delighted and refreshed with the Floater's construction and flight characteristics. It may very well be one of the gentlest aircraft in your hangar.

Give foam-core construction a try. There's something about this white, clean lightweight material that makes model design and building most satisfying. Hmm... think I'll get back to the drawing board... make that foamboard and design a gull wing... or maybe a biplane. Hmm...

*\*The following are the addresses of the manufacturers mentioned in this article:*

Sig Manufacturing Co., 401 S. Front St., Montezuma, IA 50171.

Saito, Distributed by: United Model Products, 301 Holbrook Dr., Wheeling, IL 60090.

Pacer Technology & Research, 1600 Dell Ave., Campbell, CA 95008.

Robart Manufacturing, 301 N. 5th St., St. Charles, IL 60174.

## ARF FREAK

(Continued from page 84)

as the "Grand High Exalted Mystic Rulers of R/C."

The existence of ARFs may bring increased kudos to regular balsa builders, as they'll now be building through choice



and not because they *need* to build to have a plane to fly. It's simply a matter of choice.

By all means take pride in your building skills, but don't scorn fliers who aren't also builders. They're entitled to some therapeutic fun too!

Fortunately, most ARF die-hards, including me, realize there's strength in numbers. The more of us there are, the more clout we'll have on all levels, helping to preserve our flying sites and standing with the FCC. The ARF has already done its part by increasing the popularity of our hobby/sport.

During my visit to the Chicago show one thing became increasingly evident: ARFs are here to stay, and everyone's getting in on the act. Polks Hobbies\* introduced their new 1/4-scale Cub, and Top Flite\* showed the new ARF version of the Headmaster.

One long-established large manufacturer will probably soon offer an ARF version of a low-wing model that many of us have owned and loved in years past. I'm not at liberty to disclose which model at this point, but I *will* in the near future as the ARF story continues to unfold.

One day last summer I was flying my B-25 in a field where certain individuals habitually burn derelict cars. The burning rubber and vinyl created a large, billowing cloud of dense, black smoke. To an R/Cer in a playful mood this could easily be construed as the smoke from a bombing raid, complete with flak. A B-25 enveloped in a cloud and then reappearing looks really authentic, and since the fire was at the far end of the field no one was in any danger.

On my fourth or fifth "flak" run my much-loved, veteran Mitchell failed to reappear. Enemy aircraft? Shot down? Fate worse than death? A more mundane answer: inside the smoke was a tree lurking with intent! So now my balsa-breathing hours will be spent recreating yet another of my all-time favorites, the venerable B-25—unless of course one of you ARF manufacturers are planning to do most of the work for me?

So OK, I confess, I need something to fly NOW! I'm an ARF freak! I'm going back to my basement, because when the going gets tough, the sane go flying!

*\*The following are the addresses of the manufacturers mentioned in this article:*

Hobby Lobby International, 5614 Franklin Pike Cr., P.O. Box 285, Brentwood, TN 37027.  
House of Balsa, 20134 State Rd., Cerritos, CA 90701.

Polks Modelcraft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.

Top Flite Models, 2635 S. Washash Ave., Chicago, IL 60616. ■



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# Product News



## Ni-Cd BATTs. & CHARGER

General Electric now offers a full line of rechargeable Ni-Cd batteries, ranging from AAA to 9V sizes, for a variety of hobby applications. Also available from GE is a Battery Charger for use with your rechargeable batteries. The new Battery Charger features a flip-up, see-through cover that opens to sliding plastic fixtures with spring-loaded contacts that can accommodate all five hobby battery sizes. The unit can recharge up to four AAA, AA, C or D sizes, or two 9V batteries at a time. A unique ejector system makes battery removal easy. Charger includes a 6-foot UL-listed cord and indicator lights to show when the charging cycle is completed. For more information contact General Electric Company (Nela Park, Cleveland, OH 44112).



## HOT SOCK

The Top Flite Hot Sock Iron Cover is a soft, super-smooth cloth "bootie" that fits over your iron shoe. Your iron works just like normal, with the heat transferring directly through the cloth, but the surface that touches your covering film is as smooth as the proverbial baby's bottom. Surface scratches are virtually eliminated. The Hot Sock is designed especially for Top Flite's MS-2 iron, but should work equally well on most other makes. For more information contact Top Flite Models (2635 South Wabash Ave., Chicago, IL 60616).



## ROYAL PRODUCTS

Royal's new Analog Tachometer features an easy-to-read meter, three RPM ranges from 0-32,000, and will calibrate and read 2-, 3- or 4-blade props. Tach won't put a drag on the engine and a photocell pick-up allows you to keep a safe distance from the engine. Analog Tachometer has no "number flutter," which is often associated with digital-type tachs. Operates with a 9V battery.



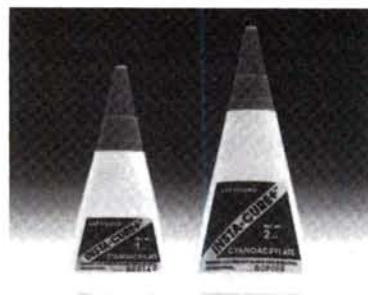
The new Royal .28 engine features Schnuerle porting, ABC piston/cylinder configuration, dual-ball-bearing-supported crankshaft, full fuel-metered carburation, massive one-piece precision crankshaft and a muffler. For more information contact Royal Products (790 West Tennessee, Denver, CO 80223).



## ROBINHOOD 63

The Robinhood 63, from World Engines, is patterned after the Curtiss Robin. When manufactured in the 1930s, it had a style all its own, which lent itself very well to model aviation. The kit is

made up of the best balsa and ply woods. Construction is generally the same as found in most built-up kits today. When finished, the Robinhood 63 makes a very lightweight but strong airplane. While this kit is not an ideal beginner's project, it makes a very nice trainer. It has very forgiving flying characteristics but is also very acrobatic. The RH-63 has a wingspan of 63 inches, a wing area of 617.4 square inches, a weight of 4-5.5 pounds, and requires a .40-.51 2-cycle or .61 4-cycle, as well as a 4-channel radio. For more information contact World Engines (8960 Rossash Rd., Cincinnati, OH 45236).



## INSTA-CURE+

Insta-Cure+ from Bob Smith Industries is a gap-filling cyanoacrylate adhesive of the highest quality and at a low retail price. Insta-Cure+ bonds virtually everything, even oily surfaces, in 10-25 seconds. Available in 1- and 2-ounce sizes. For more information contact Bob Smith Industries (7550 San Gabriel Rd., Atascadero, CA 93422).

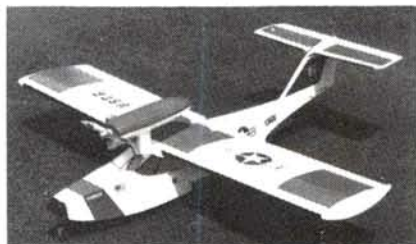


## ZENOAH G-62

World Engines (8960 Rossash Rd., Cincinnati, OH 45236) is introducing a new member to the Zenoah line of engines, the G-62. This is a 3.78-cubic-inch gasoline engine that turns a 22 x 8 Zinger prop at 8100rpm with no break-



in time! The G-62 features a new and improved magneto ignition system, easily adjustable carburetor with built-in choke, and a large-volume muffler. The G-62 runs on a regular gas/oil mixture and would be great as a large aircraft powerplant. For more information contact World Engines.



### SEAMASTER 40

Ace R/C, Inc. introduces the Seamaster, created for those who enjoy the tremendous thrill and beauty of flying off water. It also converts to a nice-looking land plane for flying off hard surfaces or grass. The Seamaster's high-lift wing provides slow, predictable flight, and it's quick to get "up-on-the-step" and break water when in the amphibian mode. While on water, the pylon-mounted engine and T-tail stabilizer stay out of water on acceleration, and a retractable water rudder prevents unwanted weather-vaning. The furnished steerable nose gear provides direction while on the ground. The Seamaster 40 has a wingspan of 59½ inches, a wing area of 725 square inches, a fuselage length of 54 inches, a weight of 7 pounds, and requires a .40 as well as .45 2-cycle or .60 4-cycle engine and a 4-channel radio. For more information contact Ace R/C, Inc. (116 W. 19th St., P.O. Box 511, Higginsville, MO 64037).



### WASP JR. CLOCK

Imitari has just introduced an exact ½-scale replica of the Pratt & Whitney Wasp Jr. engine with a clock placed in

the space normally covered by the propeller cone. The Imitari clock, under authorization from United Technologies, also carries the official registered trademark decal of Pratt & Whitney. The clock is available in kit form (more than 200 parts) or fully assembled. Imitari also carries baseball caps, T-shirts, belt buckles, decals in several different sizes, lapel pins, coffee mugs, cigarette lighters, pocket knives and even a .999 full troy ounce silver medallion, all bearing the Pratt & Whitney emblem. For more information on these and other products contact Imitari (P.O. Box 985, Athol, ID 83801).



### PHANTOM POSTER

Feel the cool heat as the F4J Phantom streaks through the stormy red sky. Cliff Kearns' rendition of the Black Phantom "Making Vapor" is an exciting example of aircraft art. This large, 23x35-inch dynamic poster is printed on 6pt. Warrenflo cover in a four-color process. A matte and gloss varnish is used.

For more information on this and other Cliff Kearns' posters, contact M&M Publishing, 392 Murray Street, London, Ontario, Canada, N6C4X4.



### BADGER

Badger's new NO-TACK Non-Adhesive Stencil Film is a 3.5ml film with a translucent matte finish which is ideal for hobbyists. Its smooth, non-porous

vellum-like surface lets you render nearly all media: airbrush, brush, permanent felt-tip marker, technical pen, knife, pencil, pastels, oils, acrylics, silk screen, etc. You can draw, shade, paint and blend colors beautifully. You can work on both sides of the film and it won't tear, discolor or become brittle with age. It's also waterproof, weatherproof and highly resistant to most solvents. NO-TACK is available in 8½x11-inch 10- or 100-sheet packs, 11x17-inch 10- or 100-sheet packs or in 15-foot rolls of either 12- or 24-inch widths.



Badger has introduced the all-new model 100-SG and the Modified 100-G Gravity Feed Air-Brushes. These dual-action airbrushes are ideal for hobbyists wherever small amounts of fluid are required and where precise detail is called for. Gravity feed allows the fluid to flow directly to the paint tip without a syphon, allowing work at lower air-pressure and enabling slower hand movement and more precise detailing. The Model 11-G and SG will spray inks, dyes, water colors (like Badger's own Air-Opaque) and thinned acrylics. The modified Model 100-G has a new permanent, top-mounted, ¼-ounce color cup for better flow and ease of cleaning. The model 100-SG has no color cup but has a built-in fluid cavity which holds a small amount of fluid. For more information contact Badger Air-Brush Co. (9128 West Belmont, Franklin Park, IL 60131).

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News**, or guarantee of performance by **Model Airplane News**. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News**.



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## EINDEKKER

(Continued from page 72)

wheel) are authentic-looking spoke wheels with sponge tires. These are a nice touch and appear to be durable enough for this application.

Fuel tank installation doesn't deviate from the norm. The vent tube was present to touch the top of the tank, and this saves all of the five seconds it would take to bend it yourself! It *does* show that the kit saves you time wherever it can. Make

certain that the landing gear attachment screws don't touch the bottom of the tank when installed.

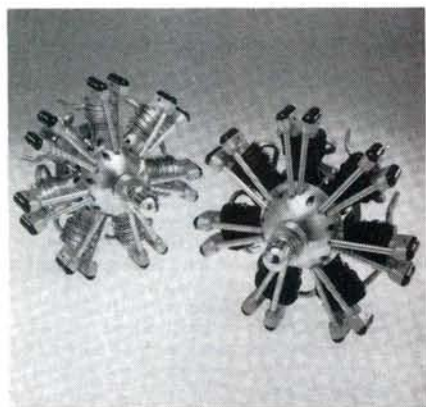
I used a Webra 80 4-stroke in my Fokker and it fit easily under the one-piece cowl. The supplied motor mount allowed the motor to extend the correct distance for good prop clearance without overextending past the cowl. I had a problem trying to mount the Webra at the specified 45-degree downward angle and still keep the carb within an acceptable range in relation to the fuel tank. This was a minor problem which I'll talk about in

the flying evaluation.

I installed a Cirrus 900XCL radio from Hobby Shack\* which fit the roomy radio area well. The tongue-and-groove servo tray could only be mounted one way, so the model could not be balanced by moving the servos. I used the solid pushrods provided in the kit, although I'm still working on a way to adequately utilize blue nyrods in a pre-built fuse such as this without adding much weight.

**PERFORMANCE:** I've developed a kind of sixth sense when it comes to test-

(Continued on page 102)



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## EINDEKKER

(Continued from page 98)

flying brand-new airplanes. If you live with the airplane through its building, or in the case of the EIII, its assembly, you see the machine take on a personality which can range from pussycat-friendly to downright ornery. You know that the pay-off will come on test-hop day!

The Fokker sits near the pussycat end of the spectrum and conveyed that impression right from the start. When I arrived at the field I felt that I was

returning with an old, tried and true, trusty airplane. The Webra 4-stroker obligingly fired right up and responded well to the high-speed needle adjustment. The idle was only fairly reliable but I figured it would improve as I put more running time on the engine. In a slight breeze take-off came in about twenty feet, climb-out was rather un-scale-like, and we were soon at cruise altitude checking stall characteristics, slow flight and aerobatic qualities. The Fokker stalls absolutely straight ahead and it's capable of hanging there with nearly zero ground speed. During these maneuvers, the engine quit at idle and I deadsticked it in with no problem at all.

After readjusting the idle, we were airborne again for the aerobatic portion of the evaluation. Knife-edge is very tough, and inverted flight requires considerable elevator input, but the other maneuvers like loops, rolls, split-S's, and Immelmann turns are well within the Fokker's capabilities. This Eidekker would not spin, probably because the nose was heavy with the additional weight of the 4-stroker up front. Moving some equipment aft to shift the CG slightly rearward will enhance the spin ability.

After another flame-out I decided that perhaps something other than carburetor mixture at idle was the culprit. After some serious head-scratching and considerable tweaking of the idle needle, I decided to return to basics and check the engine installation. Bingo, eureka, and voila! The Webra, like many other 4-strokers, mounts its carb considerably off the engine center line, and this may affect operation depending on its position relative to the fuel tank. The Fokker engine mount locates the engine in the 45-degree inverted position, which is the worst position for the Webra as it places the carb nearly one inch below the tank's fuel pick-up. All the leaning out of the idle mixture won't help this gravity-induced flooding condition. Rotating the mount to position the engine more correctly cures the problem, and now the Webra settles down to an almost inaudible idle. Even at full throttle, it is unquestionably the quietest big 4-cycle engine I've ever hardly heard! Incidentally, installation of a 2-stroke engine, with the carb mounted on the center line, will not give you these types of problems.

The EIII-40 is a good-size airplane and should appeal to the novice or intermediate flier. Although the kit supplied for this review was a framed-up, almost-ready-to-cover example, Sunshine Hob-

(Continued on page 105)



## THE ASTRO CHALLENGER NATS ELECTRIC WINNER

Bob Boucher's Astro Challenger won the 1984 Reno Nats its first time out and has been winning electric contests all over the country ever since. Powered by an Astro Cobalt 05 Geared System with a 12 inch folding propeller, the Challenger climbs almost out of sight in 45 seconds and repeats this climb three or four times on a single charge. The distinctive wing planform with elliptical wing tips maximizes aerodynamic efficiency and minimizes tip stalls. This contest champion has a very gentle and forgiving nature so it's perfect for beginners too. The deluxe kit features all machine cut and sanded balsa parts and is super easy to build and fly. Wing Span 72" • Area 612 Sq" • Airfoil Eppler 193 • Flying weight 39 oz.

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# EINDEKKER

(Continued from page 102)

bies has now advised us that this is being replaced by a ready-to-fly (pre-covered) version. All the best design features will remain. This attractively priced, built-up balsa ARF is certainly worth looking at as a friendly addition to your stable of fliers.

*\*The following are the addresses of the sources mentioned in this article:*

Sunshine Hobbies, 7221 South Western Ave., Gardena, CA 90247.

Hobby Kingdom, distributed by Sunshine Hobbies.

Coverite, 420 Babylon Road, Horsham, PA 19044.

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728. ■

# SOPRANO

(Continued from page 69)

fuelproof as I wanted it to be. This was easily rectified by spraying on a coat of clear epoxy paint. Altech is addressing this concern, and it should be improved

(Continued on page 108)

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# SOPRANO

(Continued from page 105)

soon. Test fit your engine to the mount, and note the throttle position. The mount

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requires no drilling, since the method is to hold down the engine in a slot. Now assemble the fuel tank and fit it into the nose area. I replaced the fuel tubing in the tank with a larger diameter tubing. (Something I always do to provide a more positive flow.) I also trimmed the opening around the tank to provide room for foam padding.

Assemble the tail sections as described, but do *not* mount them yet! (I don't know why, but every ARF does this to you.) First, assemble and insert the elevator pushrods into the tail section. The pushrods for the elevator are a split yoke, and are murder to blind-guide after the tail is in place. The kit shows shrink tubing to hold the assembly together. I strongly suggest that you wrap the tubes with heavy thread and CA first! When you install the horns, angle them inward to minimize any bending in the wires. You may have to expand the exit slots a little to prevent binding.

Now assemble the tail section as shown. Make sure the horizontal stab is squared to the center line, and that the vertical stab angle is checked. I used epoxy for the tail mounting, but be sure to remove the covering and expose the wood where the glue is applied.

Cut the cowl top before assembly, as it is easier to position the opening. Next, tape the outside surfaces of the cowl and apply CA or epoxy to the inside. Be careful not to flood too much glue or it will bleed through and permanently trim your plane with tape! You may want to reinforce the cowl with a little fiberglass tape.

Position the servo tray, install the linkage and radio, and you're done. While installing the receiver and servos, check the CG and servo arm clearance. I found my CG a little too far back, so I had to slug the nose with a 3-ounce weight. (The plane still only weighed 5 pounds.) By the way, since the CG is so close to the main gear, you may want to put a small bent-wire skid at the tail. One other thing: the edges of the control surfaces are not covered. To make them fuelproof, I sealed them with some thin cyanoacrylate glue.

**ENGINE:** This Soprano was powered by an Enya .45 Super Sport (see *MAN* Nov., '87) also from Altech. I put the engine on a test bench and ran a few tanks through it. Boy, this baby howls! The .45 idled smoothly and came right up to full throttle with no hesitation at all. (I used an 11 x 7.)

I'm ready!

**FLYING:** I went to my club field on a day we were having a fun fly, so there was a good crowd. The comments were all quite positive, and she hadn't even flown yet. My chance came, and I got my transmitter from the impound (owing to the fun fly). The throttle put to the wall, the Super Sport Soprano started to sing. Just the slightest touch of right rudder trim is all she took. Now, remember at the start of this article I was a little disappointed? Not any more! The Soprano flew on rails! This bird tracked very cleanly through loops, rolls, stall turns, and even cut a fairly decent knife-edge. Four-point rolls were sharp and, once on its back, the Soprano took almost no

(Continued on page 115)

**THE FOKKER:** Sorta looks like the WW I fighter flown by Rudolph Berthold, "The Mad Iron Knight". Like our other Sort-A-Scale kits, it can be built & flown by a raw recruit. 56" wing, 4 lbs., .40 2-cycle or .46 4-cycle. Finished in Black Baron Metallflake films!



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## SOPRANO

(Continued from page 108)

correction on the elevator. I'm impressed! This combination gets thumbs up by me. If you're looking for an ARF to make sweet music in the sky, try the Soprano.

*\*The following are the addresses of the manufacturers mentioned in this article:*

Altech Marketing, P.O. Box 286, Fords, NJ 08863.

Du-Bro Products, Inc., 480 Bonner Road, Wauconda, IL 60084.

## GOLDEN AGE

(Continued from page 47)

he was about the aerodynamics. He even suggested that the structure might be more important, because aerodynamically he envisioned that the Astro would not be much more than a Smog Hog with the wing on the bottom. How that thinking changed once the Astro was flying! When the rest of us reviewed Fred's design in the April '58 issue of *MAN* it *did* seem complex and overbuilt, but who can fault a sturdy design which performs so outstandingly?

Any shortcomings the Astro might have had, Bob Dunham apparently found and corrected with his modifications which did so well for him. A close look at his changes shows an approach to what we have today. He made minor changes, shortening the nose and tail moment arm for balance, increasing the span to 76 inches and extending the ailerons to the tips so they'd be more effective. The Astro, like most planes of that time, had a large angular difference between the wing and stab settings to assure automatic recovery. Bob found this detrimental in view of the speed changes which occurred. He reduced the difference to 1 degree and this increased performance. Today the 0-0 setting is popular and a negative setting may even have a further advantage.

The Astros I've flown were easy to fly and maneuver, and were so predictable that any accomplished pattern pilot would say it handles like a trainer! It would surely be interesting to see a modern Astro Hog flown through the FAI pattern.

Have you got the message? Fred Dunn and company did us all a great service. Here's a docile OTer which can match modern performance—something with OT plus modern potential.

I hope you're seeing the interesting possibilities of the OT R/C planes for the modern scene. We continue to receive suggestions that there should be an OT R/C organization. Any thoughts?

*\*The following is the address of Sig Manufacturing:*

Sig Manufacturing Co., 401 S. Front St., Montezuma, IA 50171.

## R/C NEWS

(Continued from page 50)

kits and I've never been disappointed. The BD-5J was no exception; all parts fit beautifully and everything was in the box except engine, fan, radio, retracts and finishing material. The BD-5J is an ideal entry into fan-jet action.

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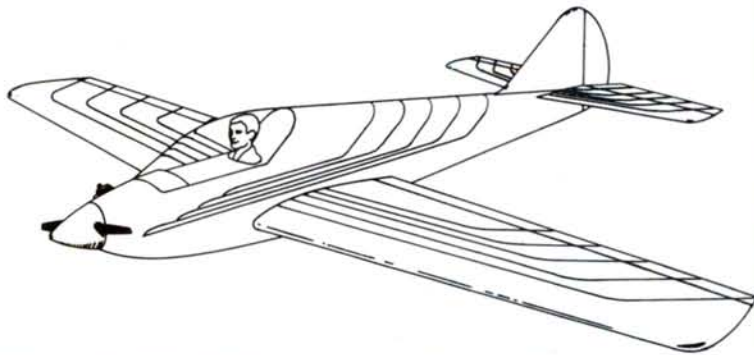
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## GIANT STEPS

(Continued from page 77)

can all reduce or modify the balance weight required. If it's necessary to move an engine forward in order to have the rear of the prop in the correct location for the cowl, it may be better to use a longer prop extension instead. Moving the engine forward will result in additional balance weight being required aft in order to balance the engine weight we moved forward. On the other hand, if more weight is required at the front, moving the engine forward may be an excellent way to get some free balance weight without adding any weight to the model. This will only work if it's possible to move the engine forward without creating any other problems.

For those who prefer to build their models from plans, I recently received three which I'll give you a brief rundown on.

Bill Effinger\* has been designing model airplanes for longer than most of us have been building them. He has an impressive line of designs behind him (and ahead of him, I hope). His latest effort to come my way is a plan for Steve Wittman's Buster.

This was Wittman's first design, and it flew competitively from 1931 to 1954, but did not display the same longevity as its designer who flew competitively right into his seventies.

The Buster is a nice size at 1/3-scale, spanning 61 inches in a one-piece wing. Construction of the Buster is only moderately difficult so it shouldn't be a problem for any modelers with some kit and plan building behind them. The plan is on three large sheets and shows the entire wingspan. (No need to build half the wing on the back of the oiled plan. Never did figure out why designers do that!)

One departure from the norm is that the fuselage is built in two sections which are joined *after* they are built. No real problem here, but be sure that they're properly aligned before the glue sets. Engines suggested range from 2 to 4 cubic inches, a range providing everything from a gentle trainer-type racer to a flaming bearcat of a model.

Both of the other arrivals came from "Doc" Jim Peppino of Scale Plans and Photo Service\*. The plans were for the classic P-26A Peashooter, originally designed in 1932. With loads of documentation available, much of it showing the

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rather colorful paint schemes used on the P-26, this could be a striking-looking model.

The two plans reviewed here are for the experienced and capable modeler. Neither should be attempted by the newcomer to model building. The plans assume a great deal of experience, and some of the steps on the plan are left to the favored methods of the individual builder. This is not meant as a criticism of the plans; they are intended for the experienced builder and the beginner wouldn't find enough information to get him through the construction process.

The fuselage of the Peashooter is built on a crutch, which is an excellent means of getting a complex shape without having to build a basic fuselage. Then add formers, and then stringers to get the final shape needed. The crutch method side-steps the initial stage of building a basic fuselage and goes directly to the shapes required. This saves a lot of time and makes a strong, light structure when properly completed.

The third plan is one I've had a number of queries about over the years. It's the famous, but overshadowed Hawker Hurricane. While the Spitfire gained the reputation of winning the Battle of Britain, there were more Hurricanes in service at the outbreak of WWII than there were Spitfires, with a ratio of 1300:950.

Jim Peppino's plan for the Hurricane is 1/5-scale and it's a biggie at that scale. The span is 80 inches and the recommended engine is 2-4 CI. Should be a real performer at that size—20.2 pounds with a 4 CI engine up front.

*\*The following are the addresses of Bill Effinger and Scale Plans and Photo Service, mentioned in this article:*

Bill Effinger—W.E. Technical Services, P.O. Box 76884, Atlanta, GA 30328.

Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403. ■

## PATTERN

(Continued from page 53)

plastic with a permanent paper backing on both top and bottom surfaces. There's no pin or hinge line, and the hinges depend for movement strictly upon the elasticity of the plastic.

Installation of the Easy Hinge is simple. Merely slot the mating surfaces with an X-Acto blade to allow fitting. Do this for all the hinges on the surface being worked

on. Insert the hinges into the slots and then mate the surface to the matching point on the aircraft. After making the proper fit, simply place a droplet of Hot Stuff\* on the hinge from above. The adhesive will spread over the paper backing and then set hard. Do this on both sides of the hinge line, and then try the ol' "heave ho" test! I've found that in my new Atlanta these hinges are holding reliably without pinning. If you've ever seen an


Atlanta fly, you know that this is no slug aircraft.

*\*The following are the addresses of the manufacturers mentioned in this article:*

Jet Hangar Hobbies, 12130G Carson St., Hawaiian Gardens, CA 90716.

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# Club of the Month

## Raleigh Aero Masters

From Raleigh, North Carolina, comes our "Club of the Month." The Rams (Raleigh Aero Masters) have been very busy in past months. They held competition flying, a club picnic dubbed "Pig Pickin'"(?), a helicopter and pattern meet, and also coped with all the clean-ups, field maintenance, budgets and meetings to which clubs fall heir. It sounds like a fun group!

Charles Frank is not only the club president, but also the editor of a very newsy, breezy newsletter. He appears to be the Art Buchwald of newsletter editors. His "Frankly Speaking," an account of his trip to a Chesapeake contest, is filled with one-liners. Apparently, all RAMs had a great time even though participants had to cope with wind, rain, crashes and emergency repairs. The good company more than compensated for the weather!

This was illustrated by Charlie's comment in "Late News Bulletins": "Guess who spent over the cost of a new airplane and engine to have the privilege of finishing *last* in Novice at Chesapeake?" We've never had so much fun reading about contest experiences!

In case you feel this is a Charles Frank award, let me say it's not, but Frank is a good representative of his members. Through his writing, we gathered that this is a club which really pulls together and truly smiles at this crazy world of R/C. We enjoyed hearing about it. But, really, what is a "Pig Pickin'"?!

We congratulate the Raleigh Aero Masters on being *Model Airplane News'* Club of the Month, and we're pleased to award two one-year subscriptions to the club, to be given to deserving members. ■

Each month *Model Airplane News* will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). *Model Airplane News* will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletter to *Model Airplane News*, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

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